December, 1970

Smithsonian

The good shepherd: a mosaic from an Italian excavation that tells the story of Christianity from underground days on

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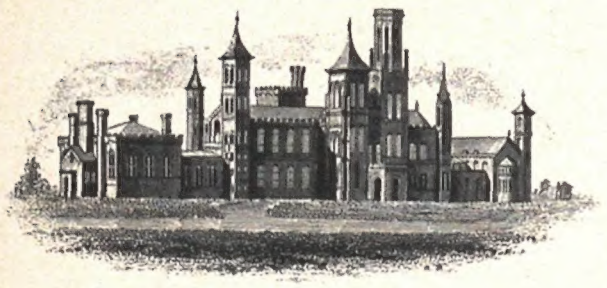
Secretary Ripley's comments

The view from the castle



The hundred-year discussion of what comes first in trying to alleviate urban crowding and fix up the total environment—continued

In this issue of SMITHSONIAN there are two articles on the environment. One is by Philip Hauser (page 20) on the irresistible trend in the world toward urbanization and his view of what should come first in rectifying our environmental problems. The other is by Edward J. Kormondy (page 26) on the senescence of and the hope for Lake Erie.

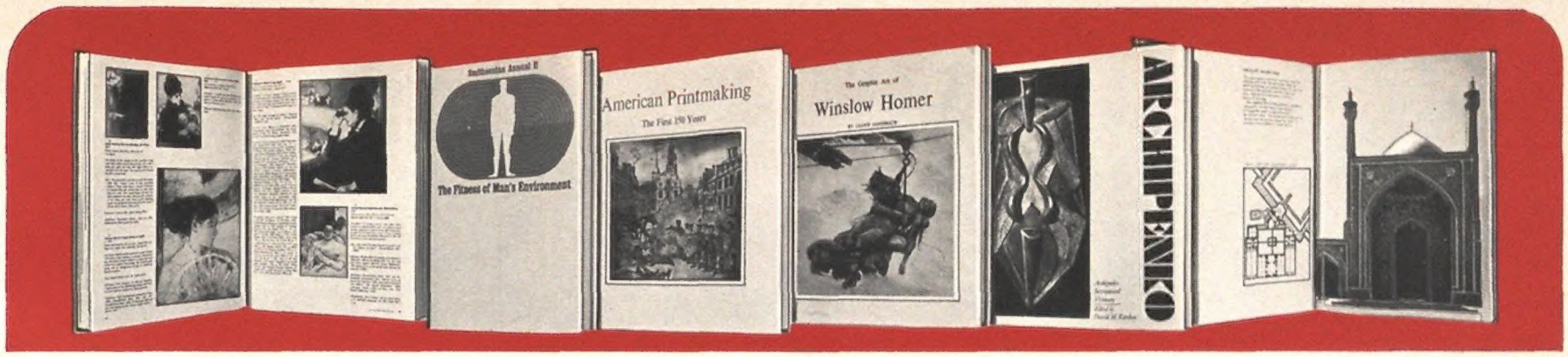
Mr. Kormondy points out the factors, including human apathy, that bring on increasing pollution of our natural environment. Mr. Hauser feels that environmental pollution, while important in itself, is far less urgent than the immediate need to correct urban blight brought on by the population implosion. I submit that this is a matter of priorities and not a debate. The articles present two aspects of the same problem, most acutely felt in North America and Western Europe. There has been a trend for more than a hundred years towards both pollution and urbanization.

In the 19th century it was soft-coal smoke and the first discernible population drift away from the farms. At the Smithsonian, Joseph Henry was deeply concerned about human stress produced by city life, uprooting of family, fierce competition, increase in vice and disease and a sense of inhumanity. Later Charles Walcott was deeply concerned with efforts to correct our technology, filtering of smoke from chimneys and studies of solar radiation developed by his assistant and successor, Charles D. Abbot.

To an ecologist like myself I observe that in the United States at present, as demographers point out, our human population rate is leveling off. It seems entirely appropriate, therefore, that we should concern ourselves directly with our own particular environment which includes our own urban blight. We can apply ourselves via our own advanced state of technology and eventually succeed. Many threats to our environment are reversible. To be concerned about the total environment in this country is not a middle class cop-out but rather a return to principles —the principles of humanity, decency and esthetics. A good deal of the rest of the world reflects a reaction to ourselves. It is not convinced that our standard of living, for example, with its built-in concomitants of consumer goods, pesticides, ever-increasing power supply and dependence on what is, to them, an alien set of value judgments about the quality of life, is either necessary or the subject of envy.

In some of these parts of the world there is a severe problem which has to do with a disequilibrium between modern techniques of medicine and food production and indigenous attitudes towards child production. In such countries everything should be done to aid the leveling off of population increase. This is the first priority, far more important even than higher crop-yielding strains of wheat and rice, for which Norman E. Borlaug has just received the Nobel Peace Prize. We would be well-advised in America not to worry so much (as missionaries do about souls) about the standard of living of the rest of the world, but rather aid population control elsewhere. Other countries' decisions on standards of living and on their environment are really up to them.

S. Dillon Ripley



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Letters to the Editor

The Maya scandal

Dear Sir: You have performed a noteworthy service in publishing Clemency Coggins' article [SMITHSONIAN, October] on the current depredations of the Maya sculpture. Mrs. Coggins' work is itself quite astonishing. It is a unique catalogue of pillage and plunder of the art of the New World without parallel for four centuries. And it is scarcely consoling to reflect that at least Cortez and his followers had some religious drive, while the plunder of our day is a response to the acquisitive instinct alone.

Ways must be found to conserve and protect the remaining Maya heritage. Your publication of Mrs. Coggins' work should stir us all to a sense of outrage, and a real effort to find cooperative international means for saving what is left.
William D. Rogers, chairman
Panel on the International Movement
of National Art Treasures
Washington, D.C.

Dear Sir: As a member of the Panel I must point out that Mrs. Coggins' brilliant article does not necessarily represent the opinion of all members.

The initiation of the Maya Rescue Project represents what we all hope will be a successful effort to put a stop to the destruction of architectural monuments.

Mrs. Coggins attacks a recent book on pre-Columbian art whose illustrations she refers to as having little archaeological or historical context. A comparison of this book with the Metropolitan Museum's splendid catalogue of its current exhibition, "Before Cortez," seems to indicate that even in the case of objects borrowed from national museums little more provenance can be provided than in the unjustly maligned volume whose only sin seems to be that it was compiled by an art dealer!

Mrs. Coggins attributed the barring of scholars in foreign countries to the "irresponsibility of a few museums." In my experience, it is due far more to local jealousies and anti-Americanism.

The article's curious assumption is that all ancient works of art should remain where early history placed them. We are all spiritual heirs of man's early art. Therefore great metropolitan centers are entitled to a fair representation.

It seems to me that this country has a special claim on the early art of regions from which came our ancestors. Los Angeles is the world's second largest Mexican city. Part of the heritage of our immigrant country is a claim on a share of the art of our common ancestors.
André Emmerich
New York City

Dear Sir: As a member of the Smithsonian National Associates and someone who has visited the Yucatán, I am proud that we are finally bringing to light this horrible mutilation of pre-Columbian art.
Peter Lewis Horn
New York City

DDT discussion

Dear Sir: Your DDT authors spend almost no words on each other's claims, and the claims themselves are mere assertions, without pretense to convincing a puzzled reader. The arguments miss each other; your "pro" is arguing almost exclusively for continuing use in poor countries, while your "contra" is arguing against continuing use in the United States.
Donald O. Walter
Brain Research Institute
University of California
Los Angeles, California

Dear Sir: In spite of the great differences of opinion in their two articles, C. F. Wurster of the Environmental Defense Fund and J. W. Wright of the World Health Organization are in tacit agreement on one vitally important use of DDT: its continued application for the control of malaria in huge numbers of people in the developing countries.

Some 500,000 tons of DDT (my estimate) have been used—but not consumed—in the global attempt to eradicate malaria. It is ridiculous for Wright to state that this DDT does not "contaminate the general environment" because it is applied inside human habitations.

Grossly excessive amounts of DDT have been sprayed on the inside walls of houses by many of the programs assisted by the World Health Organization. Over ten years, in several countries, I saw a great many wall surfaces that were literally whitewashed with DDT.

It is imperative, therefore, that the World Health Organization develop—and insist upon the implementation of—a technology for the application of DDT.

DDT on the inside walls of houses is effective for the control of malaria only when the local anophelines enter houses to feed on man. Many species of anophelines do their biting of man outside of the walls of his home. And many homes in the rural tropics have no walls at all.
J. Austin Kerr, M.D.
Chevy Chase, Maryland

The joys of the fair

Dear Sir: Pat McGorum's fun-filled panegyric to fairs brought back fond memories of my onetime boss, born in 1876 and named after the Philadelphia Exposition, "Charles Centennial Peters."

And another thing, that nectar you called "pear cider" has its very own name, "perry." It should no more be called "pear cider" than a bull should be called a "he cow"; although mountain men still do when womenfolk are around.
Arthur J. Morgan
New York City

What kind of churn?

Dear Sir: "A celebration of American folkways" in the September SMITHSONIAN shows what is purported to be a dasher churn and a barrel churn. You sure missed the boat on that one.

I have used both, and neither of those you show qualify. Dasher churns were made of wooden staves, were larger at the bottom and tapered up to a smaller top with a tight-fitting tapered lid with a hole in the middle for the plunger.

The barrel churn likewise was made with wooden staves and was in fact a small barrel with a door in one side having a glass port through which you could see when the butter "came." It had a pinion or short iron shaft anchored to the middle on opposite sides. One was longer than the other with a crank on the outer end. You turned the crank and the barrel rotated end over end with a ca-chunk-ca-chunk-ca-chunk sound, but when the butter started to come the sound changed to a sort of ker-splash-ker-

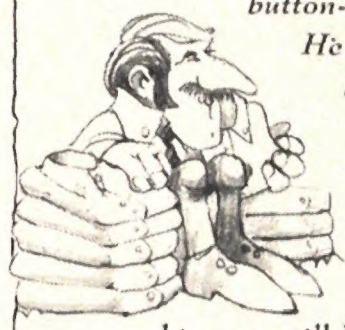
splash-ker-splash. Then in the window appeared little beads of yellow. More cranking, and soon the butter gathered and you got a splash-thud-splash-thud with few yellow beads in the window.

Then you anchored the barrel in a slanting position with a hook to one of the uprights, got your crock, and a glass or a mug, pulled out the cork right at the corner on the down end, caught yourself a glass full of that de-e-e-licious buttermilk, and perhaps two or more gallons to put down in the springhouse to cool.
R. C. Kyle
Kelsey, California

Dear Sir: Neither churn shown is a barrel churn. The one so designated is merely a more sophisticated dasher churn.
Clair Phillips
Grand Rapids, Minnesota

There is no agreement among experts or in dictionaries as to churn nomenclature, which varies from one section of the country to another. For example a dasher is usually wood but in certain parts of the South a ceramic churn is used. Ed.

She goes to Harvard. She made Phi Beta Kappa. She's all knowledge with FACTS-IN-FIVE.* *How can she tell her father she's transferring to Vassar?*



He digs white button-down shirts. He tells knock-knock jokes. He always loses at BLUE LINE HOCKEY.* *Can a man his age still learn how to figure skate?*

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By Alfred Friendly

From underground Christianity upward: Aquileia's glories

Bypassed by tourists, the little Italian city's patient digging into its past sheds light on the beginnings of the Church

Five miles south of the busy highway between Venice and Trieste, the sunbaked little village of Aquileia drowses under the Adriatic sky. The tourist, passing through, gives it no thought, unless it is a moment of puzzlement at why a settlement of some 1,500 inhabitants possesses such an outsized church and such a towering campanile.

Yet the little town shelters a glowingly beautiful and unique treasure. It is the wonderfully preserved remnants of a vast center of Christian worship, built by Christians in the teeming days of the Roman Empire and using the art forms of the Caesars. And, almost alone among existing monuments, it came into being in the few years just before and just after Christianity was officially sanctioned by the Emperor Constantine, at a most critical time of church history.

Half of it was built as a clandestine, "underground" church in the days when Rome still banned the profession of Christianity; the rest was constructed just after Constantine issued the Edict of Milan, in A.D. 313, which legalized the faith.

There are earlier relics of Christianity in western Europe and the Middle East, but nothing resembling Aquileia. Castel Sant' Angelo in Rome (once Hadrian's tomb), the multitude of Greek and Roman temples made over into Christian churches, even the very ancient Mithraic crypts used as early places of Christian worship—all these are older than Aquileia. But they were adaptations of existing structures, not built by Christians for themselves expressly to celebrate their new religion.

The pearl in Aquileia's crown is not the existing 11th-century church or the huge bell tower. It is, instead, several thousand square feet of mosaic flooring. Part of it is the floor of the present church, but, taken altogether, it originally formed the floors of two earlier churches. One was secret and disguised, most of it built before A.D. 313. The other, created in the

The author is associate editor of the Washington Post, *based in London, but he ranges all over Europe and the Middle East. He won a Pulitzer prize for coverage of the six-day war.*

Nine to ten centuries separate the upper reaches (above) of the Basilica from its floor, a mosaic pavement laid in the fourth century. Carpet protects mosaics from feet of worshipers at church.

years immediately thereafter and adjacent to the first, was open—triumphant and exulting. Both were brought into being by the same man, Theodore—Roman citizen, man of wealth and station, potentate of the Church, Bishop of Aquileia.

I am someone who can take mosaics or leave them alone, but not those in the village at the northeast tip of the Adriatic. Beginning in 1949, I have visited Aquileia five times—most recently last September with my wife, to pick up the threads of continuing conversation with the grand old man responsible for the great work of excavation and research that has laid bare the treasures. He is Professor Giovanni Brusin (see p. 17), honorary or emeritus curator, a native son of the town, born when it was still part of the Austro-Hungarian Empire. He is now 87 years old but he is still *in gamba*, the sparkle of his enthusiasm undimmed by the years.

Bald, wispy and subdued, Brusin takes fire when he talks of the place he has uncovered, stone by stone, in 50 years of work. His eyes flash and his hands move expressively to nail down each point. Our conversation was carried on in German, the one tongue common to us both, but with him every other sentence was larded with Latin—the language that, I suspect, lies nearest the old gentleman's heart.

"How do you know," I would ask, "that Aquileia

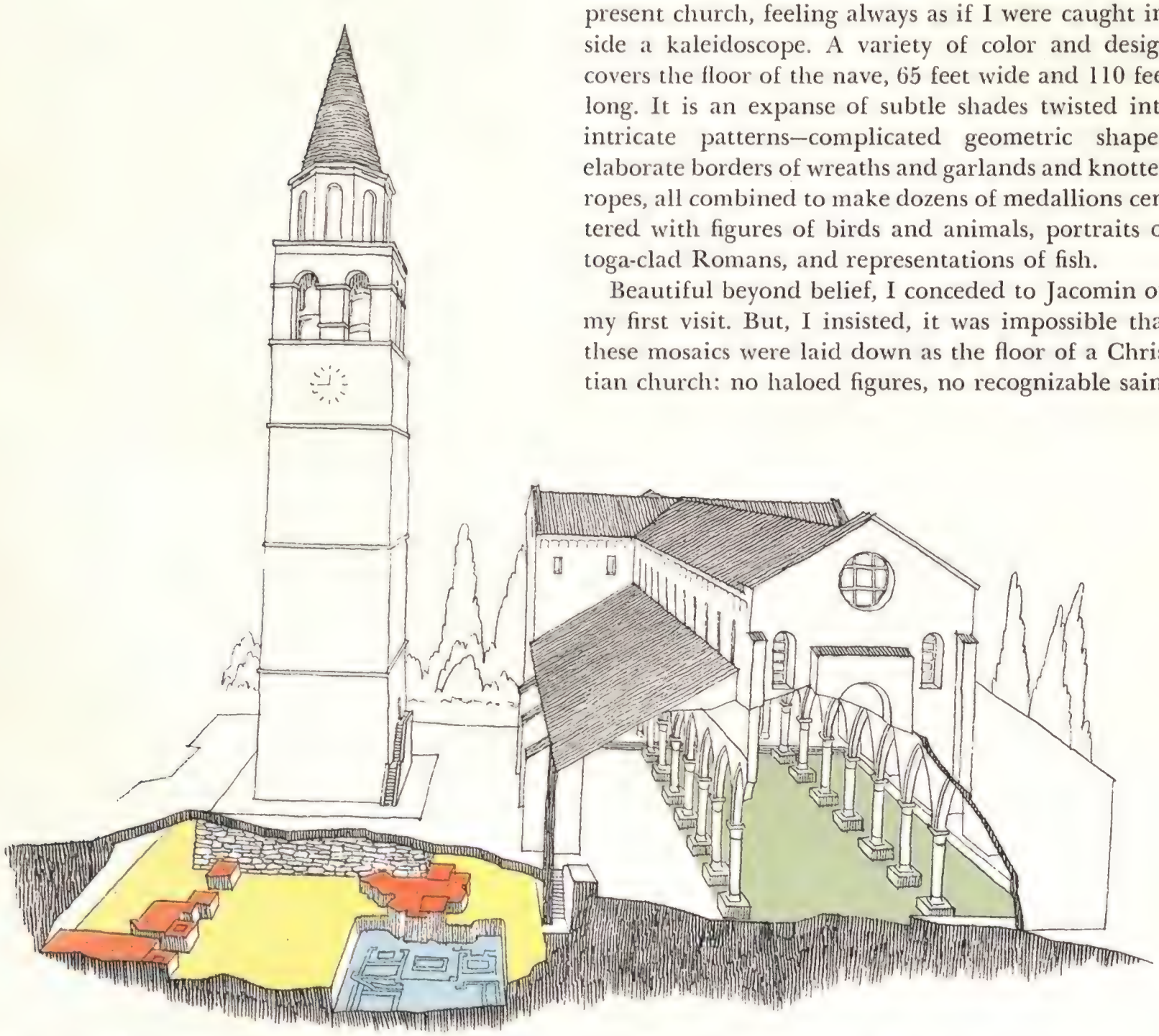
was, as you claim, a strong Christian center before the religion was made legal?"

"For one thing," he would reply, "there is a pedestal to a statue we found that reads—" and here he would lapse into a long Latin quotation.

"*Auf Deutsch, bitte,*" I would plead, my Latin lying unfortunately some 40 years behind me. And out would pour the translation, in this case of a third-century inscription telling how the citizenry had *re*-erected a statue to Neptune that had been previously thrown down some 50 to 75 years before the Edict of Milan. It could only have been a Christian sect, momentarily emboldened, Brusin argued, that would have demolished a statue to a Roman god.

In his company, and on earlier visits in that of Guglielmo Jacomin, longtime custodian and now archivist of Aquileia, I have wandered through the present church, feeling always as if I were caught inside a kaleidoscope. A variety of color and design covers the floor of the nave, 65 feet wide and 110 feet long. It is an expanse of subtle shades twisted into intricate patterns—complicated geometric shapes, elaborate borders of wreaths and garlands and knotted ropes, all combined to make dozens of medallions centered with figures of birds and animals, portraits of toga-clad Romans, and representations of fish.

Beautiful beyond belief, I conceded to Jacomin on my first visit. But, I insisted, it was impossible that these mosaics were laid down as the floor of a Christian church: no haloed figures, no recognizable saint



The Basilica of Aquileia is composed of several layers. In the drawing above, the blue level is the remains of an ordinary Roman house. The mosaic floor of Theodore's first and secret oratory is shown in yellow. The floor of the second and open oratory, seen above in green, now forms the nave and right aisle of the present church. Ruins of a fifth-century church are orange.

or symbol of one, no keys of St. Peter, no sign of the cross. This blaze of color and intricacy of execution must be pagan. It seemed to be the floor of some palace, sophisticated in design and color.

Brusin told me later that when the floor was first seriously investigated in 1909—he was then a teacher of Latin and Greek in Trieste—he and the senior researchers were similarly baffled. What they were dealing with dawned on them only when they uncovered a splendid mosaic medallion, perhaps four feet in diameter, portraying the Good Shepherd with a lamb across his shoulders (see cover). It is a figure, incidentally, often found in the catacombs of Rome.

Secret symbols of Christianity

The other designs then began to make sense. The next giveaway was a winged female figure (incongruously, a Roman goddess, no less) holding laurel and palm, and before her a bowl of bread and an urn of grapes—the victory of the Eucharist.

But mostly the Christian nature of the place is betrayed by the superabundance of fish. This symbol, rather than the cross, was the early sign of the new religion. In part, it derives from the fact that in Greek the word for fish is *ichthys* (ιχθυς), which can be read as an acronym of the five Greek words making up the phrase: "Jesus Christ, Son of God, Savior." But, more important, the fish was the early and frequent symbol of man's soul, swimming in the universal sea, to be gathered into salvation. And indeed scene after scene in the glowing mosaic shows angels and priests, laymen and saints, catching the fish by every means—net, hook, line, harpoon and noose.

The fish became less prominent in Christian iconography after the fourth century, when it was succeeded by the cross. That symbol had never been used undisguised because it was too close to the then reality of execution in its most degrading and terrible form.

One must move about three-quarters of the way down the nave of the church, however, to find the emblems of the fundamental tenet of the Christian faith: sin and redemption. The design of the floor suddenly changes. A mosaic border broader than the others marks an end to the series of medallions.

Beyond the border is a great free-flowing scene, unbroken by formal pattern. It is a "seascape" the width of the church, 65 feet, and perhaps 25 feet deep. It is an ocean on which and in which—without benefit of perspective—are great hosts of fish, each one different, about three feet long, and perfectly executed. In the sea are boats with figures in them. In one, a man raises his arms as if in supplication. This is the Praying One, the *Orans,* found frequently in the catacombs and usually representing the soul. Another figure in the

Top: a lower level mosaic depicting the struggle between orthodox Christianity and the Arian heresy. The Victory of the Eucharist (middle) and the pheasants (bottom) are on the present floor.

Around and under the foundations of the present bell tower are the mosaic floors of a much older structure, the first oratory created—possibly in his own home—by Bishop Theodore before Christianity was made legal.

boat is occupied with stuffing one of their number down the gullet of a *pistrix,* a 10-foot-long sea serpent beside a small craft. To the right there are two more scenes of the same size. The whole is a giant fourth-century version of a comic strip, except that it is of the deepest religious significance.

It is the story of Jonah called Jonas by Christ, taken from the Old Testament by the early Christians as their first allegory of death, resurrection and life everlasting. A sinner, Jonah is cast out of the ship of the Church and hurled to the monster (his shipmates make perfectly sure of his fate by carefully tucking him into the "whale's" throat). In the next scene Jonah, in God's mercy, is redeemed—that is, disgorged by the monster (in fact, he is shot from the beast's mouth like an acrobat from a circus cannon). In the third scene, he lies in a hammock under the gourd vine that the Lord caused to grow over him.

No religious scholar, I had not known of this Christian metaphor until I saw Aquileia, and on my first visit with Brusin I asked him to tell me more about it. The reply, as I suspected it would be, came again in Latin, but fortunately the translation is at hand, thanks to the classicists who did it for King James. It is from Matthew 12:38-40 and reads:

> Then certain of the scribes and of the Pharisees answered, saying, Master, we would see a sign from thee.
>
> But he answered and said unto them, An evil and adulterous generation seeketh after a sign; and there shall no sign be given to it, but the sign of the prophet Jonas:
>
> For as Jonas was three days and three nights in the whale's belly; so shall the Son of man be three days and three nights in the heart of the earth.

The story of this unique treasure of earliest Christian art comes into focus only as part of the history of the town itself. Before exploring the church further, therefore, let us look at the setting.

The little farming village of Aquileia, it turns out, was once the fourth largest Italian metropolis of the Roman Empire, surpassed only by Rome itself, Milan and Capua. As a commercial and military center it was probably second only to Rome.

The city owed its origin to geographical and strategic reasons. The wars with Hannibal made the Roman Senate acutely conscious that Rome itself was never going to be safe unless all of Italy was strongly defended. One place where it was not was at the natural border of the Carnic and Julian Alps. Strong groups of barbarian warriors could and did come down into the narrow plain between the Alps and the Adriatic. It was necessary to bar the door that nature had left open.

Accordingly, Aquileia was founded, and by the practical Roman method that killed two birds with one stone. In 181 B.C. some 3,000 veterans of the legions were given land grants of about 75 acres apiece, a process that rewarded them for their services and created a new frontier town populated by exactly that element most desired—hard-bitten and experienced fighting men.

Situated at the confluence of large rivers, linked to

the sea a few miles away by canals, Aquileia became a powerful strongpoint, commanding the routes into the eastern Alps, defending the coastal plain, and astride the natural East-West land route. Almost at once the character of the settlement changed from a defensive fortress to a base for conquest.

The wars eventually subsided and the city could devote itself to peaceful pursuits. By Augustus' time it had become the capital of "Venetia et Histria," one of the provinces into which Augustus divided Italy. It was the only city outside of Rome with the right to strike its own coins.

For the first two centuries of the Empire, wealth flowed into Aquileia; palaces rose up along the central street, and an arena, a circus, forums and great baths. But as the years rolled on, the pacification achieved by Augustus gave way to stormy times. In A.D. 167, Aquileia became again a military headquarters, this time for Marcus Aurelius. The city was at its peak; the Emperor used it as his base in his battles against the invading barbarians.

A short 50 years later, the Empire was in decay; rival emperors contested for the throne in Rome. One of them, Maximinius the Thracian, besieged Aquileia, again the military headquarters of the Roman army, in A.D. 238. Signs of the war, the *bellum Aquileiense,* can still be seen, for the citizens of the beleaguered fortress tore down many of their most conspicuous monuments to use them, as stone and rubble, in strengthening the walls.

Although Christianity spread comparatively late into northern Italy, it may have reached Aquileia as early as the first century A.D., largely due to the city's crossroads position as a center of commerce between the east coast of Italy and the eastern Mediterranean.

Theodore, first bishop of Aquileia

The first bishop whose name is clearly established by history was Theodore, who served as the "underground" religious leader from 308 to 313, when the liberating Edict of Milan was issued, and thereafter until his death as the recognized head of the Christian community. That he served as bishop part of the time in secret and part of the time during the first years of legality is what makes his work so fascinating.

It would appear that he was a man of wealth, for the first church he built seems to be essentially the enlargement of a handsome room, probably in his own house, into a worship hall or oratory. Here, it is believed, the Christians professed their faith clandestinely.

What remains of the oratory is, again, the mosaic floor and a foot or two of one of the frescoed walls (decorated, as in Pompeiian houses, with borders, garlands and small pastoral figures). The floor forms a rectangle a few yards away from, and adjacent to, the floor of the present-day church which is the first thing the visitor sees. Today's church is on the site of the second oratory built by Theodore, after the Edict of Milan, to accommodate his growing flock.

The older oratory, the enlarged room of Theodore's own house, is smaller than the second one and lies underground, entered by a tunnel from the present church. A large portion of it was unhappily obliterated by the foundations of the huge bell tower which was built in the 11th century, but what remains of the mosaics are as beautiful and as interesting as those of the later oratory and even more superbly executed.

At one end of this first oratory, a mosaic inscription reads: *(Theodo)re Felix Hic Crevisti Hic Felix*—"Happy Theodore, here you grew up, here you were happy." The rest of the floor, half the size of a tennis court, looks to be that of the reception or entertainment room, richly decorated and embellished, of a wealthy Roman. Undoubtedly, that was the impression it was designed to give for the benefit of the non-Christians who came into the house. In the elaborate medallions of a braying donkey here, a gorgeous pheasant there, a saddled goat with cornucopia—in all of these, the unsuspecting would find nothing to suggest the meeting place of an interdicted and secret sect.

The dedication to "happy Theodore" in the floor of his second oratory, perhaps where the altar stood.

The *Catholic Encyclopedia* points out that the life of the catacombs, and the "discipline of the Secret" which grew out of it, made it necessary for the early Christians to veil their beliefs under other symbols.

That this hall was a religious meeting place is revealed, as in the later oratory of Theodore, by the same distinctive break in the design of the mosaic and by a band of orange marble running across the room. The larger part of the room, what we would think of as the nave, must have been for the congregation. The orange marble band is a sort of embryonic transept. Behind it, in what would be the precursor of an apse, was the altar and the area where the clergy officiated. One part of it has no symbolic images, only geometric designs; the thought is that it was covered by a rug and was the location of the bishop's chair.

Close to this section the most interesting and vibrant design of all is to be found. It is a brownish-black tortoise and a vivid rooster, the two of them obviously in combat. The symbols may be of pagan origin, but adopted by the Christians to express a new concept—the battle between light and darkness, between faith and idolatry, between Christianity and heathenism. The rooster, rising with the sun, is the figure of light. The tortoise represents the Arian heresy.

The story of Jonah in the upper nave: At right he is stuffed into the monster; in the middle, he is violently ejected and at far right he enjoys the shade of the vine that God grew over him.

At the time when Theodore's first oratory was laid out, it is interesting to note, the magnificent mosaics in the Roman imperial palaces and temples had as subject matter scenes of hunting and gladiatorial battle. These were highly symbolic: the portrayals of Jupiter or Hercules were in fact representations of the current emperors, heroic figures triumphing over wild animals, bespeaking power and conquest.

On the floors at Aquileia, however, there are no such scenes—indeed, no wild animals at all. The figures are of birds and pastoral and domesticated beasts. The mood is peaceful.

"Is there not some special reason why Christian art in this crucial period of persecution repeats over and over again this pastoral scene," asks a classical art scholar, H. P. L'Orange in a recent book, "and develops it with poignancy to a degree never reached before or later in Christian art?"

Discussing the Aquileia mosaics, he continues: "Does it not seem as though the pastoral animal motif is deliberately contrasted with the heroic Herculean program put forward by the state and the emperors? Is it not symptomatic of the whole situation at this time that herds of meek and kindly animals should be represented in preference to hordes of wild beasts in the arena? Is not the peaceful life of the shepherd with his flock deliberately contrasted with the hunter pursuing savage monsters? Do we not have here the antagonism between the *Pastor Bonus* and the Herculean emperor?"

After the edict granting toleration to Christianity, Theodore soon laid out his second church about 15 yards to one side of the first. Safe from persecution, the artists who made it gave free rein to their talents, glorying in representations of men and beasts, presenting a veritable Noah's ark of animals and a mosaic aquarium faithfully reproducing the fish that must have abounded in the nearby Adriatic.

"Isn't it delicious," Brusin said to me, bubbling over as if this were the first time he had ever beheld the scene, "how out of the colors and techniques that

were not Christian, but Roman, a Christian motive was drawn?"

Elsewhere on the floor there are mosaic portraits of individual men and women. These were the donors who gave money to build the oratory. In other early churches the mosaic floors commemorate the donors only with an inscription, such as *Petrus Notarius Votum Solvit*—"Peter, the notary, fulfilled his pledge" (*i.e.*, to provide money for a certain amount of construction). But in Theodore's rich church the benefactor was memorialized by his own portrait in thousands of bits of brightly colored stone.

Near the "transept" is a circle, partly broken by four separate spots (possibly marking the four feet of the stone altar). Within the circle is an inscription:

THEODORE-FELI(X)
(A)DIUVANTE*DEO
OMNIPOTENTE*ET
POEMNIO CAELITUS TIBI
(TRA) DITUM*OMNIA
(B)AEATE*FECISTI*ET
GLORIOSE*DEDICAS
TI

"Happy, O Theodore, who hast, with the aid of Almighty God and the flock entrusted to thee from heaven, joyfully carried out all this and gloriously consecrated it."

The inscription must have been laid down just after Theodore's death. What is remarkable is that just above it, inside the circle, is the chi-rho, ☧, the first two letters of Christ's name in Greek. Although the chi-rho was occasionally used before Constantine's time, it came into fashion in his day and derived triumphal significance from the fact that he placed it on his standard, after his famous vision in A.D. 312. Thus we have in Aquileia one of the earliest examples of the symbol used ever since by the Church.

On my last visit, I pushed Brusin as hard as I knew how on whether anything had emerged in his study and subsequent excavations of his beloved city to shake the conviction, molded more than 60 years ago, that the great floor was indeed the floor of Theodore's covert, then overt, church.

"On the contrary," he assured me, twinkling from behind the desk in his study, half buried in manuscripts, plans, sketches and mountains of books. "Everything we have found bears it out."

But the innocent-looking mosaic floor designs, the ducks and partridges, the animals of farm and field, must they be cryptic Christian symbols?

"Ach," Brusin chuckled, *"Muss sein.* That's too much to demand that an archaeologist say. But I believe profoundly that they are in fact secret symbols. In the days when Christianity was outlawed and worship by a congregation could only take place clandestinely, the shepherd of the Christian flock could not appear as such, openly. But the faithful knew, for he carried the shepherd's crook."

For the last ten years the archaeological work in Aquileia has been under the direction of Professor Brusin's successor, Dr. Luisa Bertacchi. She has uncovered some lovely finds, Brusin related admiringly—recently a beautiful Roman head—although nothing particularly significant in the church itself.

"But there's so much more to be done," the old man sighed, "so much that will be lost or degraded if it's not recovered. Just the other day we found an Augustan inscription—mind you, Augustan—on a stone used as a coping supporting the side of a road."

Chance preserved the mosaics

Happily, for all the venerable scholar's lament, the archaeological pearl, the church floor, has been beautifully preserved. The question arises as to how that came about, when so little else of fourth-century Christian structural art has remained in Europe. The explanation is that Theodore's two worship halls were not destroyed by the barbarians but were outgrown. The religious importance of Aquileia increased suddenly and enormously to the point where the two older structures had to be knocked down to make way

for one great church that covered the site of both.

Thus it was that the floors were not ripped up or ruined by the torch of the invading barbarians. Rather, they were buried under a new floor some three feet higher. Sealed off under a protective layer of fill, the mosaics were preserved so that their original splendor of color and design emerged relatively undimmed almost 1,450 years later.

Aquileia played its part in the Athanasian-Arian schism, that great debate over the divinity or essential nature of Christ which threatened to break apart Constantine's empire as well as the Catholic Church itself. (The cock-and-tortoise mosaic is an allusion to it.) Aquileia was the site of a synod in 381, presided over by St. Valerian of Aquileia and attended by two score or more bishops. It ordered the deposition of certain stubborn partisans of Arius from their offices.

In the years that followed, the city was the scene of many more church councils, its history as an ecclesiastical center running on for almost a thousand proud years.

Almost nothing remains of the enormous fifth-century church that was built over Theodore's two oratories. There are a few traces of the floor, three feet above the level of the earlier ones. The later floor was also mosaic, but crudely done and almost devoid of artistic interest, a measure of the rapid deterioration of art and craftsmanship as the Roman Empire declined under the barbarian onslaughts.

After the sacking of Aquileia, by Attila the Hun in 452, some of its residents who had fled to Grado and the surrounding lagoons returned to build their city anew. Others, it is interesting to note, moved westward along the lagoons and founded what became the city of Venice, the metropolis that replaced Aquileia as the center of commerce and queen of the Adriatic. But repeated victories by invading barbarians, followed by the victory of malaria in the marshes no longer drained by the redoubtable Romans, finally spelled the end of the city.

Thanks to Brusin and Dr. Bertacchi, some measure of its onetime grandeur can be sensed. In part, one finds it in the museum, one of the finest and most beautifully organized I have ever visited. One also finds it in the excavations, just enough to give a clue to what was the old forum, the amphitheater, many other Christian churches and oratories, the houses, the quays, the necropolis and the triumphal monuments.

Indeed, Jacomin confided to me, half in awe and half as a joke, that the people of the town call Brusin "the second Attila" because of his formidable prowess in knocking down modern structures to get at the ancient ones underneath. Brusin himself confesses that in his drive for discovery no holds were barred. Once he descended without so much as a by-your-leave on an enormous barn owned by a local baron while the unsuspecting nobleman was off in Vienna for medical treatment. Brusin discovered just what he expected: the mosaic floors of a fifth-century Christian church, as big as Theodore's but not nearly so beautiful, interesting or superbly executed.

Even with Brusin's work, however, only a small section of the old city has been laid bare. Brusin told me ruefully that when he came to work in 1920 he was determined to see all of ancient Aquileia, but "now at the end of my life, I haven't seen all of it yet."

What may bother him even more is that so few others have seen even that which he has made evident. "I've written so much about this place that I'm ashamed of myself," he lamented. "But everyone seems to think Italy stops at Venice. *Sum vox clamantis in deserto.*"

I tried to thank this "voice in the wilderness" whose call at least a few people have heard. He, to my amazement, insisted on thanking me instead. "When someone loves Aquileia," he said, "it is we here who owe thanks."

For all his sorrow that his entire town has not been brought to today's sunlight, Brusin has the right to feel himself a man fulfilled. Roman ruins are abundant in Italy. No tears need be shed that some are still hidden under the farms and pigpens of Aquileia. What has been excavated is unique—a dying civilization caught at the moment that it bequeathed its art to a different culture, our own, at the instant when that new civilization was drawing its first free breath.

Professor Giovanni Brusin, 87, has supervised the excavation of ancient Aquileia for 50 years—not just the Basilica, but the Roman city as well.

Fish used to be scared when we looked

Not long ago, the oil industry usually looked for offshore oil with dynamite.

They exploded it underwater and recorded the telltale echoes on a seismograph.

When carefully done, this did little or no harm to aquatic life. But fish were sometimes scared and fled to quieter waters. Fishermen frowned.

Now, the Esso Production Research Company (a Jersey affiliate) has invented a substitute for dynamite. We have nicknamed it the popper and you can see one in our picture. It doesn't go bang like dynamite. It simply goes pop.

The device is beautifully simple. A mixture of propane and oxygen is ignited by a spark plug inside a rubber sleeve. The pop inflates the sleeve like an instant balloon.

This sudden expansion is strong enough to give a seismic echo, but not so strong that it hurts the fish.

But fishermen aren't the only people to cheer.

Dynamite is often tricky stuff to handle.

for oil. Now they couldn't care less.

The popper is much safer. Exploration crews have less danger to contend with.

What's more, a crew using a popper can do an underwater survey six times faster than a crew using dynamite. They can work night and day in rough weather. Whereas a dynamite crew needs daylight and comparative calm. And our popper gives a better seismic picture in the bargain.

Esso Production Research has now made the popper available to the oil industry around the world.

Good news for oilmen. Great news for fish. Quite an invention.

Standard Oil Company
(New Jersey)

Esso

By Philip M. Hauser

What to do as population explodes, implodes, displodes

Zero growth is all very well, but slum clearance should take place before total environmental reform is attempted

The problems of population and environment in the United States have received a great deal of attention in recent months. But much that has been said and written has been so distorted that our short-run public zeal may turn into long-run public apathy. Loud assertions that it is already too late to prevent ecological disaster may make a lot of people ask themselves, "Why bother to do anything about it?"

Above all we must get our priorities right. Despite the views of overall environmentalists, it is more important to eliminate Chicago slums than to clean up Lake Michigan.

So important are these problems that we must vaccinate ourselves against a reaction of indifference on the part of the public. So let us explore some of the distortions:

► "The population explosion is responsible for environmental pollution."

This statement fails to recognize that even if there is no further growth in population, high levels of production and consumption could increase pollution. Similarly, a continued growth of population need not necessarily increase pollution.

Crowding and poor living like those in some parts of Chicago (left) are bad, but the minorities who suffer are not to blame for population problems of the United States.

► "Technology is to blame for the environmental pollution."

Technology is not an evil but a neutral agent which can be used for good or evil. It has been permitted to produce pollution in the United States, but it can also be used to eliminate it.

► "Environmental pollution is caused by the free-enterprise system."

Socialist systems are as concerned about pollution problems as capitalist systems. Russia is worried about caviar production because of pollution in the Caspian Sea.

► "Tens of millions of people will starve to death during the 1970s."

Nonsense. For the first time, some Asian countries have food surpluses to export—the miracle rice that they do not like to eat themselves. Yet it would be absurd, also, to deny that mankind will face future food shortages. All the "green revolution" of the past few years has done is give man two, three, possibly four decades in which he has an opportunity to decrease population growth.

So population and environmental data must be viewed in perspective. Man not only adapts to his environment but adapts it to his requirements. He has done much to modify nature while increasing his life-span from 18 or 20 years at the time of the Roman Empire to 70 years in the United States today.

Man or some close kissing cousin has been on this planet for about four million years. During the relatively recent years of his occupation, Man has generated three developments which have profoundly affected his values and actions. These are:

► the population explosion—the remarkable growth

This article is adapted from the forthcoming book *Cope: Crisis and Crusade*, edited by Noel Hinrichs, copyright 1970 McGraw-Hill, Inc.

Action—of a sort—in a Chicago slum;
lawmakers have not responded to city blight.

of the species during the three centuries of the modern era;

► the population implosion—increasing concentration of people on relatively small portions of the earth, in other words, urbanization;

► the population displosion—increasing heterogeneity, or ethnic and cultural diversity, of people sharing the same locale and activities.

Man is still trying to learn how to live in the world he has created for himself.

The world's population did not reach one billion until about 1850. A second billion people were produced in the next 80 years, and a third billion in only 30 years. If the present birth and mortality trends continue, there are likely to be 7.5 billion people on the earth by the year 2000. The global population, in other words, may increase by as many persons in the next three decades as there are now in the world.

There was insufficient technological development and social organization for cities of 100,000 or more to appear until the time of the Greco-Roman civilization. The proliferation of cities of a million or more began only about 170 years ago. By the United Nations definition of urban (a population of 20,000 or more), the fraction of the world population that was urban in 1800 was only slightly more than two percent, and by the end of this century it may be between 40 and 50 percent.

Different peoples crowded together

The worldwide displosion of the population is more difficult to measure than the explosion and the implosion. For as many years as we have any data, diverse peoples have lived on our planet, but only in our time have so many of them shared common geographic areas, living space and activities. The frictions that this displosion has brought about are evident between the Protestants and the Catholics in Northern Ireland, between the Arabs and the Israelis in the Middle East, between Chinese and Malays in Malasia, between Muslims and Hindus in India and Pakistan, among the various Hindu groups within India, and between the white and black people of the United States. Such problems can best be understood as part of a transition that is still under way from a pre-urban to a metropolitan world.

Within the United States, developments have been similar to those in other countries. When our first census was taken in 1790, we were a nation of fewer than four million people. The results of the 1970 census indicate a population of more than 204 million. Short of catastrophe, we seem almost certain to have 300 million people by the end of this century.

A second postwar baby boom has already begun. The products of the first one have reached the reproductive age, and this boom is an echo of that one. In October 1968, for the first time since 1957, the number of births in one month exceeded the number in the same month of the preceding year. A recession tends to decrease marriage and birthrates. The high proportion of people of reproductive age among us now, nevertheless, makes it almost certain that even if the birthrate dips, it will rise again. The women between 20 and 29 are increasing by 35 percent in our country between 1968 and 1975.

Does this mean, as the alarm criers say, that we should have compulsory family limitation now? In my judgment, no.

Look at it this way: The average number of children per completed family in the United States was six in 1800 but has fallen to three. Voluntarily, we

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have diminished the number of children born during the reproductive life of couples by 50 percent. With present mortality, a zero rate of population growth requires 2.11 children per family. Our country is already close enough to this average to achieve a stable population without any of the sanctions or penalties that frightened persons advocate.

The population implosion gave rise to many of the collective needs to which our governmental system has responded too slowly. Ninety-five percent of the American people lived on farms or in towns of fewer than 2,500 when our first census was taken. Fifty-one percent of us were urban by 1920, and 70 percent by 1960. We have been a predominantly urban country for only half a century, which is less than one lifetime. The transition has brought on the urban crisis.

It is virtually certain that the 100 million persons whom we may add to our total population in the next 30 years will be mostly urban. So metropolises may grow even faster in the future than our nation's total population.

In our country the dramatic story of the black people has highlighted the population displosion. Let me place that story in perspective:

Only 51 percent of the American people were native white of native parentage in 1900. The other 49 percent were foreign-born, second-generation immigrants, blacks or members of other races. As recently as 1960, the latter groups still constituted 30 percent, nearly a third, of our population.

About 89 percent of all nonwhites lived in the South as recently as 1910, and that figure had changed by only two or three percent since 1860. By 1960, however, only 60 percent were in the South.

American heritage and black revolt

Even more significantly, the black people have been urbanized more rapidly than the whites. In 1910, before the great internal migratory movement began, 73 percent of all this country's blacks were rural people. Fifty years later, 73 percent were urban. Among the black people, moreover, 23 percent of those 25 or more years old were functionally illiterate. They had not gone beyond the fifth grade in school and had not reached a stage at which they could read a metropolitan newspaper with ease. This was their share of the American heritage. These facts are requisite to understanding the revolt of the blacks.

What are the problems our population history has generated? We have seen effects of the explosion, implosion and displosion throughout both our schools and our economy. The first postwar baby boom swept youngsters through the schools like a

The problem of pollution is very real, as shown by the slime on Chicago waters.

tidal wave, completely inundating elementary, secondary and higher education institutions. Now this generation is joining the labor force, and we have high rates of unemployment among youth—especially, of course, among disadvantaged young blacks.

The police report that delinquency and crime are increasing much more rapidly than the population. Standing alone, this statement seems pretty naive to a demographer. During the 1960s the number of youngsters between 15 and 19 years old—from whom, by definition, delinquency comes—was increasing by 46 percent. Delinquency would have increased by reason of the size of this age group even if the delinquency *rate* had remained the same. We did not have a 46 percent increase in police, however, or in reformatories, or in any other agencies that might have prevented or dealt with delinquency.

The automotive insurance companies discovered what reserves were for in the 1960s when the number of persons 20 to 25 years old increased by 54 percent. Few things in our way of life are as dangerous as a male under 25 years of age behind the wheel of an automobile. We are now slaughtering 56,000 people

a year with the automobiles on our highways, and a significant part of this toll is a result of the change in the age structure of our population.

How will we deal with these problems?

Although the disadvantaged groups, the poor and uneducated, have large families, their contribution to total population growth in the United States is relatively small. Distributing contraceptives to these people will not suffice to halt the growth.

What can family planning do?

In the United States the population problem resides mainly in the dominant white middle-class people having third and fourth children. These are the people who must reduce the average number of children per couple from three to 2.11.

But what about minorities and underprivileged peoples of Asia, Latin America and Africa? No one knows yet what family planning will do for them.

We have yet to discover whether peoples who are mired in illiteracy and poverty, isolated as subcultural groups, and living in a traditional type of society, can decrease their birthrate. But we do know there has never been a people on the face of this earth that, having acquired literacy, education and a fair level of living, did not reduce its birthrate.

Personal and social problems as well as physical challenges have been generated by the population implosion. These include crime and delinquency, alcoholism, drug addiction and the revolt of youth. They are characterized at one extreme by the hippies, young folk seeking some way of retreating from our society because they cannot cope with it. At the other extreme we have the frenzied activists who are now blowing themselves up with bombs intended to destroy the establishment.

The revolt of women is a further consequence of the population implosion. Urbanization has dramatically changed the role of a woman from that of simply being female to being a human being. Unemployment and underemployment are also ascribable in part at least to the distribution of our people—and demand our attention.

A cultural lag in the relationships between our federal, state and local governments has made it exceedingly difficult to meet the challenges of metropolitanism as a way of life. Although a majority of the people in 39 of our states was urban by 1960, the urban citizenry did not yet control the legislature of a single state.

By deliberately delaying reapportionments, the state legislatures have given us a fine example of civil disobedience. They forced the large percentage of our city people to turn to the federal government for help. The national government has not usurped state rights. State legislatures have made themselves a fifth wheel by ignoring urban problems.

The displosion in population has obviously added to the difficulty of obtaining gratification of new collective needs, and has also brought on a new problem. This is the white backlash to the still rising power of the blacks; it could tear us apart.

I would like to vaccinate against the distortions that may change public zeal into public apathy. Population and environment hucksterism must be given credit for creating awareness, but in overstating anticipated consequences they may boomerang and cause public disillusionment. For example:

Zero population growth, we are told, must be achieved as rapidly as possible, even through a drastic decrease in the birthrate.

To believe in the slogan "Zero Population Growth" is similar to believing in the law of gravitation—it is inevitable. Given the finite dimensions of this planet any rate of population growth will, in the long run, produce saturation. The question is not should there be zero population growth, but at what rate and by what means is it to be achieved.

Zero growth will solve the youth problem

There is nothing in prospect in our country that necessitates a negative growth rate. Nor is there any need to put pressure on a couple to have only one child. We can achieve a stable population without any such drastic measures.

Young people's adoption of the zero-population-growth slogan intrigues me. Given our present and anticipated mortality rate, the achievement of zero population growth by the end of this century would increase the average age of the American people from about 27, at present, to 40. The number over 60 would rise from about 12 percent to more than 20 percent. From the standpoint of us elders, that clearly would solve the youth problem.

We must and can grapple with problems of the environment. We must also control fertility and find ways to meet the many other problems posed by the population explosion, implosion and displosion. Both factual and profound philosophical questions are involved in our choice of priorities. Let's not allow pollution to become a smokescreen to distract us from more immediate challenges to mankind.

India has one of the worst population problems. These thousands celebrate at a chariot festival in the city of Puri.

At Cleveland the river disfigures Lake Erie
by adding vivid-colored waste from steel mills.

By Edward J. Kormondy

Lake Erie is aging but effort can save it from death

The beach ponds of a sandy peninsula show ecologists what goes on and suggest ways to reverse choking eutrophication

Humorist Art Buchwald recently had a column titled, "Mother Nature is Dying." Bedded down in a nursing home, visitorless, feeling the imminence of death, denied medical information, Mother Nature lamented that her only attention was a periodic check of temperature and pulse. No therapy, no medication, no restraints, just a leaving there to die.

In some considerable measure, this describes Lake Erie: increasingly visitorless as more and more beaches and fishing areas are closed, feeling death from reports in the newspapers, receiving no therapy but only periodic diagnostic checks on her temperature and body chemistry. Diagnosis: premature and accelerating aging. Prognosis: premature and impending death.

Is there no cause for hope, no treatment that can alter the inevitable? There is, but with a sizable price tag payable in both dollars and human behavior.

Before looking at the price tag and Man's pollution

At Buffalo blue water flowing in is quickly lost to turbidity caused by pollutants.

(pictures above), we should consider the "aging disease" of Lake Erie. Biologists recognize that it is experiencing what all organisms experience; in simple terms it is growing old.

As are individuals, organized ecological systems such as lakes, fields and forests are subject to aging; the volatile vigor of youth gives way to the staid stability of old age. These broad generalizations can be better understood by looking at an actual ecological system as it ages, at something smaller and less complex than our ultimate topic, Lake Erie.

At the western end of Erie, Pennsylvania, extending five miles into Lake Erie is Presque Isle, a sandy curving peninsula. This is one of the finest recreation spots on the Great Lakes with gentle surf, clean sandy beaches and protected lagoons (see next pages).

Known as a sandspit, the geologists' term, Presque Isle probably initiated its development about 2,000 years ago, some five miles west of its present location. As our map shows, action of water on sand—eroding, depositing—coupled with the continual fluctuation of water level—rising and falling—not only gave birth to the peninsula but accounted for its growth and development, for its shift in location and for short- and long-term changes in its outline and appearance.

In the building and tearing down of the edges, an occasional sandbar is deposited so that a portion of Lake Erie is isolated. Some of these portions are mere puddles and barely last a day; others are relatively large ponds and last hundreds of years. Because such ponds have been and still are formed in the same way

The author, ecologist and former biology professor, has written four books, including Concepts of Ecology. *He is now the director of two offices for biological education in Washington, D.C.*

and from essentially the same materials, the peninsula provides an ideal situation in which to study aging in natural systems. Instead of waiting for a pond to age, one merely finds ponds of different ages like those of our photographs. Ponds nearest the current shoreline are the youngest; those progressively farther back not only are progressively older but also indicate the location of earlier shorelines.

Cottonwoods prove this assertion. They dominate the peninsula, especially the younger, more exposed portions; when the seeds with their dandelionlike "feathers" are released, the landscape appears as if covered with a light blanket of snow. Despite the multitude of seeds, new cottonwoods are found only at water's edge, for they germinate only on clean moist sand free of other plants. New beach ponds provide ideal germinating conditions for cottonwoods; as a result, the new ponds are neatly bordered by one- and two-year-old trees, and those that have vanished can be identified by a cottonwood border that remains as a kind of monument.

Thus a new cottonwood and a new pond are companions from the outset of each. Older ponds, even three or four years old, no longer germinate cottonwoods, probably because of competition from the cottonwoods already there and from other plants that have started in the meantime. By determining the age of the cottonwoods around a pond (this can be done without hurting the tree by taking a small boring in the trunk and counting the tree rings) the age of a pond can be estimated with an error of no more than two or three years. We can give some quite accurate dates to the ponds selected for study, a step that allows us to get rates for various features of aging.

Changes occur in all three spatial dimensions, in the kinds and numbers of plants and animals, in the depth and texture of the bottom, in the chemistry and physics of the water. At the beginning a pond is open, exposed, truly naked, without vegetation in or around it; at the end it is a tract of land, fully clothed in plants, without water. The beginning and end are as different as day from night, but not so abruptly achieved; the changes (over perhaps 150 to 250 years) are continuous and subtle, eluding the most cautious and watchful observer. Only upon looking at systems of different ages is the cumulative effect evident. That kind of looking is what we have done at Presque Isle.

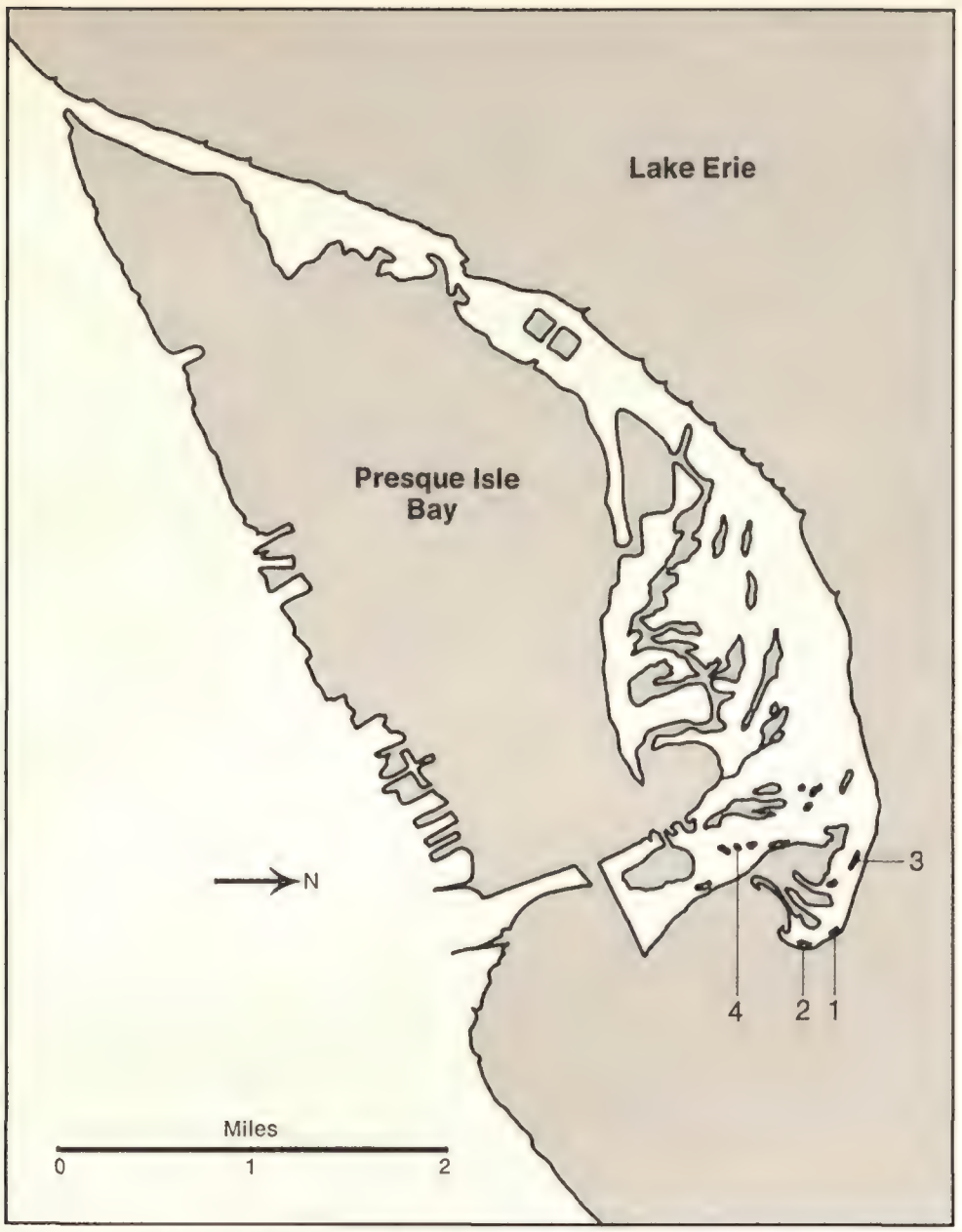
To get a good idea of what happens to a beach pond as it ages, imagine a saucer whose rim you build up gradually with clay and whose bottom you fill gradually with dirt. The sides of a pond build up with sand to heights of two and three feet because the young cottonwoods, acting somewhat like a snow fence, collect at their bases sand carried from the open beach by the wind. The collecting continues, eventually building a distinct ridge or dune around the pond. In some places, such as Sleeping Bear Dune along Lake Michigan's northern shores, these ridges not only build to heights of several hundred feet but in the process bury the very trees that initially caused the sand to collect.

In addition to this ridge building, the pond becomes progressively shallower as the bottom is filled with the remains of its inhabitants. Plants and animals die and leave their remains. They accumulate as muck and ooze. At first these remnants of life are quite organized so that a specialist can identify them, even to species, with considerable confidence. Gradually, under the action of bacteria and fungi and oxygen, the greatest of decomposing agents, the structures become fragmented, disorganized, the fibers of life disarrayed into an organic goo. Depending on other circumstances, the organic material may be mixed with dirt, sand and gravel; in these beach ponds, however, owing in part to the protection afforded by the ring of cottonwoods, the organic material is quite uncontaminated and becomes progessively more gooey.

The pond fills; population changes

Bottom filling, coupled with increased vegetation that draws off much water to satisfy its growth needs, reduces the volume of water in the original basin until eventually no standing water exists at all. The pond has become a field. Left to its own devices—for you note no action of Man was involved—an open, naked pond changes to a closed, vegetated field.

While all this ridge building and bottom filling are going on, other changes occur. At first, the pond's population has few kinds of plants and relatively few individuals representing each kind. Toward the end, there is a considerable variety of kinds occurring in



Map of Presque Isle as it is today shows its ponds. Numbers one to four locate those shown on pages 30-31, left to right.

relatively great abundance. Closer scrutiny reveals that few of the species that were present at first are still around at the terminal stages; many others have joined the community along the way. This comes about through the changes wrought by the organisms themselves. An example will help.

In the very early years of a pond, a plant known as stonewort is found in all the ponds; although it is leafy like a higher-order plant, it is actually an alga. The name derives from its rough, gritty, stonelike surface, which is covered by crystals of lime, calcium carbonate. As the stonewort photosynthesizes, it releases carbon dioxide as do other plants; however the carbon dioxide from this plant reacts with calcium in the water and releases it as a gritty precipitate.

Through the dissolving action of water and the death of all or parts of the stonewort, lime accumulates in the pond. This progressive building changes the chemistry of the pond water so much that conditions become intolerable for the stonewort. It is gradually excluded from the community. The place of stonewort on the bottom is taken by other plants that can tolerate both the altered chemical conditions of the water and the texture of the substrate. Replacement, then, is a natural process occurring, in this case, by a kind of suicide activity on the part of some organisms. Those that persist pretty much throughout the active life of a pond, must obviously have a wide tolerance to altered conditions. Other species cannot become members of the community until conditions favorable to their establishment come about. Typically the yellow water lily is not found in Presque Isle ponds until 30 or 40 years have passed.

Plants make and use oxygen

Colonization, eradication, replacement, persistence —all describe the changing facade of a beach pond as it ages. No man intervenes; natural biological activities of metabolism, death and decay, affected by conditions of weather, sunlight, temperature and substrate, are the responsible agents.

One other change is in the relationship between organisms and oxygen. Green plants not only produce oxygen, but they also use it in metabolizing energy. In a young pond, oxygen is more than sufficient to meet the needs of the community; the plants have ample light to be highly productive of oxygen. As the pond ages, however, not only does oxygen production fall off; demand for oxygen is also increased by the presence of more individuals and different species. Significantly adding to the oxygen demand are dead and dying remains of organisms that accumulate on the bottom—because of a lack of oxygen.

You see, if organic material, like a plant body, is decomposed completely, there is nothing left but the small amount of minerals that were initially part of the body. Water goes out fast, and that constitutes about three-quarters of an organism; the carbon, hydrogen, oxygen and nitrogen that were bound together as carbohydrates, fats and proteins escape.

Oxygen alone can bring about this degradation, but the process is greatly speeded by microorganisms—bacteria and fungi. But these decomposers, as ecologists call them, have a terrifically high oxygen demand. If they don't get enough, decomposition is slowed and organic matter accumulates. The process is also adversely affected by cold; the combination of insufficient oxygen and cold accounts for the accumulation of peat in northern ponds.

In the beach ponds, the balance in favor of oxygen production over demand continues for only relatively few years. In 50 years, only about 75 percent of the demand is met, and after that the balance shifts very

rapidly, causing the ponds to acquire a stagnant, weed-choked, marshlike appearance.

What has all this to do with Lake Erie? Everything and more. What we see is that in the absence of human intervention, ecological systems experience change—inexorable, persistent, dramatic and predictable.

By analogy Lake Erie is a big beach pond. Actually it is but a great impoundment of a great river, the St. Lawrence waterway, the "dam" being the Niagara escarpment. Erie is smallest in volume and shallowest of the Great Lakes: its volume is but 130 cubic miles.

Although the Lake has had a considerable geological history, only the last 11,000 years are relevant to our story. This is the period since the last glacial retreat, which left Erie more or less in its present shape, exposed and barren, like a new beach pond, vulnerable to ecological change, colonization and replacement of organisms, physical and chemical alteration. Lake Erie was prone to change because it was an ecological system. Unlike the beach ponds, the changes were compounded and sometimes perhaps ameliorated by the flow of water through it.

Like its sisters along the St. Lawrence waterway, Lake Erie was initially poor in nutrients (like phosphates and nitrates) and crystal clear because few organisms existed at this low nutrient level. But, unlike its sisters, Erie had a shallow basin, was bordered on the south by easily eroded land and received the drainage of the three upper lakes (Superior, Michigan, Huron). Nutrients washing off the land and draining in from the upper lakes set in motion the enrichment that ecologists call eutrophication. Unused nutrients and nutrients incorporated in organisms that die tend to "rain down" to the bottom. In deep lakes, these nutrients stay on the bottom, but in shallow lakes like Erie, various hydrological activities bring the nutrients to the surface where they can be used by surface organisms in growth and reproduction. The more nutrients and the greater the circulation, the greater the growth.

Although there are no precise data prior to the middle of the last century, general accounts of the biology of Lake Erie suggest it had been subject to this eutrophication earlier and that given enough time, perhaps several centuries, it would have become increasingly marshlike, and, except for a river channel, its edges would have become forested. Lake Erie was not to be given this time.

Natural eutrophication was to be aided by cultural eutrophication, the enrichment of a system as a consequence of man's activities. A natural process was to be considerably accelerated by another natural agent—Man. Man, like the stonewort already described, takes things from his environment, processes them, and returns them as waste.

As Man moved in increasing numbers into the drainage area of Erie, his biological wastes added to the nutrient enrichment from erosion and drainage from the upper lakes. Consequently nutrient levels increased in the Lake, and the cycle of increased growth, death, decomposition, oxygen demand and organic-matter accumulation was set in motion. One of the latter-day consequences of this activity has been the restriction on swimming owing to the high potential for disease in areas enriched by human sewage. For example, in 1967 one-third of the 83 beaches on the

New pond (1), naked and alone, is created when sand isolates a portion of the lake.

In first few years (2) cottonwoods and other vegetation begin to form a fringe on the border.

southern shore of the Lake were closed to swimming for the whole season; another third were only periodically safe.

Man further compounded the already accelerated eutrophication by using fertilizers in such prodigal quantities that considerable excesses drained off into the Lake. In the mid-1960s it was estimated that 17 percent of Lake Erie's phosphates were derived from agricultural fertilizers. Still later, phosphate-rich detergents, as Kenneth Reese wrote in the August SMITHSONIAN, came to account for more than 40 percent of the Lake's phosphates.

Man also began to add other nutrients like chlorides and sulfates from industrial plants of all kinds. From some of those same plants he added various acids and alkalis and other wastes that did not enrich; rather they killed oxygen-producing organisms as well as others, thereby placing greater demands for oxygen to decompose these organisms. Compounding this, many of these wastes themselves used oxygen. The consequence has been that in recent years, 70 percent of the central part of the Lake has had severe oxygen depletion at the bottom.

From an economic standpoint, this accelerated eutrophication has had severe consequences on fishing, both commercial and sport.

There was a time when Erie harbored all the piscatorial delicacies: trout, sturgeon, lake herring, whitefish. There was a time later in eutrophication when walleye and blue pike were prevalent. The time is now and these gastronomic delights have been replaced largely by carp, yellow perch, smelt and sheepshead. Lake herring catches, which reached a high of 49 million pounds in 1918, were but 1,000 pounds in 1965; whitefish, which reached a high of seven million pounds in 1949, was down to 6,000 pounds in 1965. The story is the same for other fish. Man's own actions have thus resulted in lost income amounting to several millions of dollars for those dependent on the fishing industry. These consequences of natural eutrophication augmented by cultural eutrophication have led to such statements as "Lake Erie is dead," and "Lake Erie, the world's biggest cesspool." The latter appellation is certainly not far from the truth, but the former is not accurate. Dying, yes; dead, no. A chance for survival, yes, but at considerable cost. The remedies are implicit in the causes: control erosion, process human sewage, regulate industrial effluents.

Although man's brain gives him the capacity for prediction and prognosis, his actions are more often set in motion in response to an immediate crisis than by an impending one. Thus, in spite of numerous warnings from scientists, it took particularly large growths ("blooms") of an obnoxious alga (obnoxious in the taste and color it gave to drinking water) in Lake Zurich, Switzerland, and in Lake Washington at Seattle to arouse people at all levels to act. The result for the latter was the public financing of a system to treat and divert sewage to Puget Sound; the consequence has been a reversal of the eutrophication.

At several levels, government agencies, state, federal and international (recall that half of Lake Erie's borders are Canadian) continue to support basic research on the Great Lakes at considerable amounts, very little of which, however, is directed to correcting the fundamental problems. These sources need to

At age 50, trees and sand have built an edge and bottom has begun to fill with sediment (3).

After 150 to 250 years filling is complete (4), and pond has become dry land again.

focus on those innovative steps that might reverse cultural eutrophication. These might include the harvesting of aquatic plants and unattractive fish such as carp and sheepshead to remove nutrients and decrease the oxygen demand for decomposition when they die.

Other remedies to reverse the cultural eutrophication must include altered farming practices. These involve not only prudent use of fertilizers but also their application at times and in forms in which there is maximum retention by the soil. At present, for example, manure, an excellent natural fertilizer, is typically spread on frozen soil; in consequence, spring thaws and rains drain large amounts of this fertilizer to adjacent streams and into Lake Erie.

Human cultural changes regarding restricted tree cutting on shoreline and streamlining properties, nonflush-through toilets and leakproof motors on boats are seemingly modest changes, but they and the other correctives mentioned require a substantial change in attitude toward a natural resource.

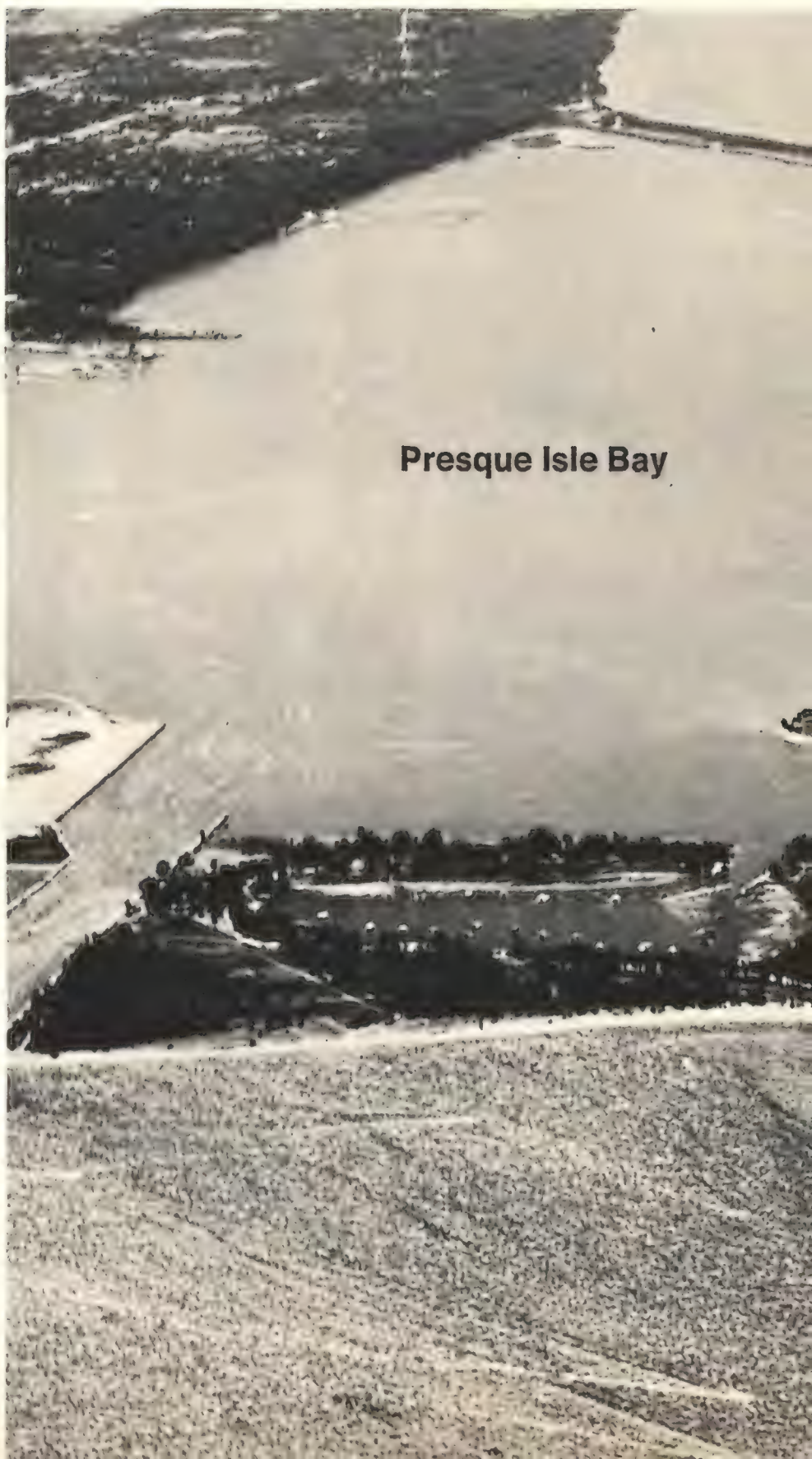
Various governmental jurisdictions involving Lake Erie are beginning, slowly, methodically—and politically—to respond.

The Federal Water Quality Administration, which began its study on the cleanup of Lake Erie in 1963, has made numerous recommendations for stopping and reversing the degradation of the Lake water. Cleanup depends extensively on new and improved municipal and industrial waste-treatment facilities. Immediate construction costs for at least secondary treatment throughout the United States part of the basin were conservatively estimated at more than one billion dollars, with an additional several billion dollars needed by 1990.

That is only the beginning. These figures do not begin to deal with the pollution by agricultural runoffs, ship and boat wastes, shore erosion, offshore drilling and heat.

It is expected that efficient control of phosphorus and other nutrients that now fertilize the growth of algae will drastically cut back the spread of this aquatic life now befouling much of the Lake.

The in-lake treatment and removal of the algae already there is another problem. Some, of course, would wash away in the normal flushing of the lake.



The sandspit, Presque Isle, probably started 2,000 years ago five miles west of where it is now. A peninsula (right), it was an island as late as the twenties.

Since algae are short-lived, many of them fall to the bottom, where they are either covered by sediment or they decompose and their nutrients are recycled in the lake. One possibility is selective harvesting of algae from the Lake; another, less feasible, idea is to dredge Lake Erie. The cost to dredge the top three feet of sediment would be many billions of dollars, and dredging would take many decades.

But despite specific proposals and recommendations and the existing engineering ability to clean the Lake, the progress is slow. The Federal Water Quality Administration goal of a clean Lake Erie by 1972 would seem a dream in light of last summer's Lake Erie Federal-State Enforcement Conference. Investigators there reported that 78 of 110 cities were not meeting a cleanup schedule set in 1967 and that 44 of 130 industries were behind schedule. The federal government was also criticized for advocating pollution control but then providing only 10 percent of the funds that were legislated.

Man will move with the needed acceleration to decelerate the cultural eutrophication of the Lake only when people force that acceleration. I am convinced there is still time to "save Lake Erie," but I need to be convinced that the people in its basin are really ready to mount the effort required to do it. On a larger scale, I need to be convinced that the common man yet realizes the severity of his environmental crisis and is prepared to accept the social and personal sacrifices that will be required to resolve it.

Lake Erie

Come to New Zealand

In New Zealand you don't have to leave the country to see another country.

Because some of the best parts of Norway, Switzerland, England, Africa and Polynesia are all in New Zealand.

In Milford Sound you can see Norwegian fjords.

Mountains dropping straight down into still waters that really do run deep. (About a mile down.)

Then when you've seen Norway, travel a little farther south and see Switzerland. In New Zealand's Southern Alps. (You know you can take them seriously because a famous mountain climber practiced on them before he took a crack at Mt. Everest.)

You'll find England too, all over Christchurch.

In little country houses. That are beside a little Avon River. That's spotted with spotlessly white ducks. That swim beside grass so green you wouldn't believe the color if you weren't seeing it with your very own eyes.

There's even some African jungle in New Zealand. In the tropical rainforests just outside of cosmopolitan Auckland. Sweet and pungent. From toetoe grass, punga ferns, and acacia trees, too.

You'll find traces of Polynesia in just about every museum. In the history, art and artifacts of the Maoris. (They're the Polynesians who discovered New Zealand.)

But you don't have to go to a museum to learn about the Maoris.

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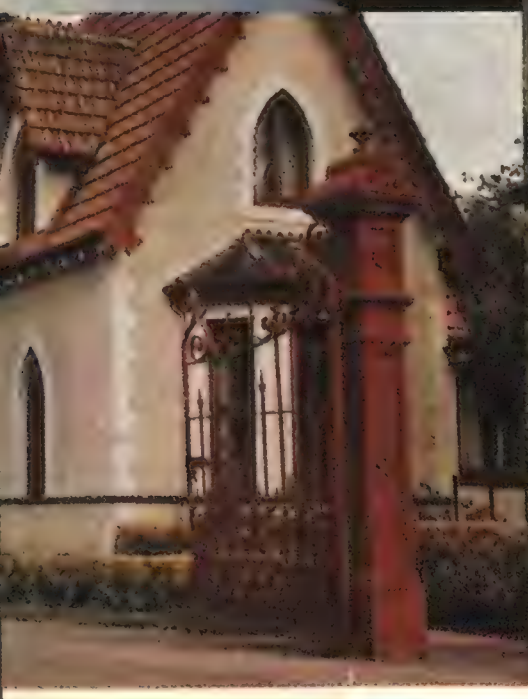
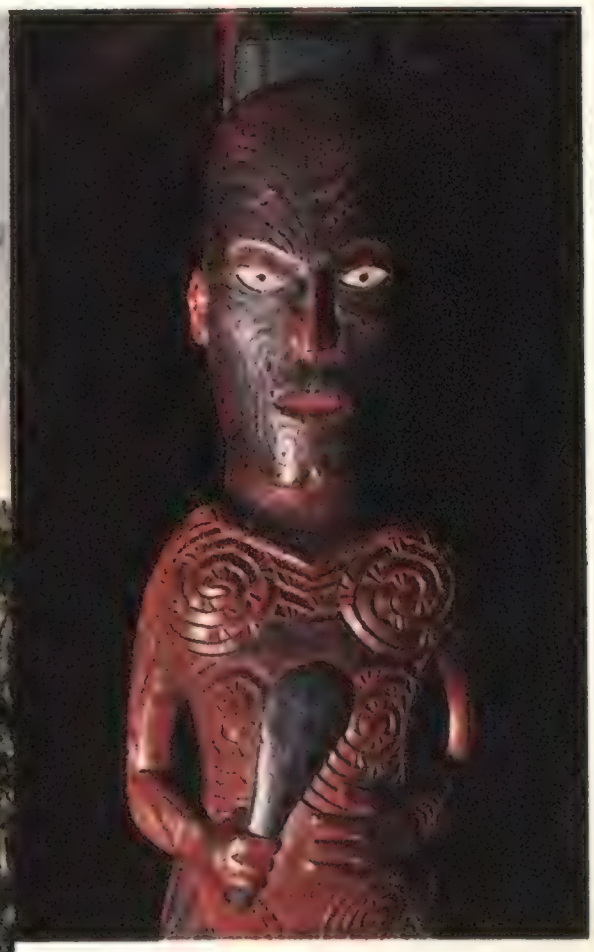




By Sylvia K. Sikes

Baby elephants cavort in Africa's surviving herds

An expert and intimate report of how the young of our greatest land mammal learn life at mother's massive knee

When the African elephant became the subject of my own research I looked in vain through libraries and catalogues for a recently published book which would provide me with basic facts of African elephant biology, research findings and modern concepts of man's exploitation of the species. The book I sought did not exist, so I have attempted to write it myself. Each of the two genera of living elephants contains only one surviving species: *Elephas maximus* (Linnaeus) and *Loxodonta africana* (Blumenbach). *Elephas* is indigenous to Asia and its range includes India, Ceylon [SMITHSONIAN, April 1970], Assam, Burma, Siam, Malaysia, Sumatra and Borneo. Asiatic elephants are generally regarded as shorter in the shoulder than the African species and are said to weigh less.

The African elephant's maximum reliably recorded shoulder height is 13 feet 2 inches [on display at the Smithsonian's Museum of Natural History]. The skin is usually a grayish color, the trunk is long, slightly annulated and at its tip has one fingerlike projection above and one below.

The African elephant possesses grave disadvantages in modern Africa—its bulk and tremendous energy turnover. Africa is a land of limited carrying capacity for man and beast, limited and unreliable water and limited arable acreage which is constantly diminishing with desert encroachment while human populations are rapidly increasing. Unless husbanded on a long-term basis, it seems unlikely that the species will survive in the wild for more than a few decades.

Dr. Sikes is a consultant zoologist in Nigeria. This is an excerpt from her book, The African Elephant, *to be published by American Elsevier. Her comments are condensed from its preface and introduction.*

It is not certain when baby elephants actually begin to eat green food, but they begin to play with it almost immediately after they have learned to suckle and walk. They soon learn to pick up and play with soft grasses and leaves dropped by the mother, as if imitating her. As the little trunk strengthens it is used to explore the foliage. Although there is no evidence, one wonders if at this stage the little elephant may be vulnerable to snakebite. The delicate exploratory trunk, poking into bushes, grass and termitaria, may well disturb an occasional . . . boomslang, mamba or puff adder.

Up to about six months the calf sticks close to its own mother's side. However, all observers agree that in cases where the mother of a very young calf is shot, the calf is almost invariably . . . adopted by another nursing cow in the herd.

By about six months of age the little calf may move farther from its mother's side, exploring and tasting different leaves. It is at this period that it is particu-

Pressing its head against its mother's flank, a baby elephant paws at a jungle log.

larly likely to be left behind if the herd is disturbed and stampeded; and at this age most elephant calves are captured for zoos. This is the age of maximum vulnerability to predators such as lions . . . and hyenas.

Yearling calves tend to play together a lot and are delightful to watch in what appear to be mock battles for supremacy, games involving trunk-slapping and squeals, rolling over and gamboling. They may at this stage have already cut, or be just cutting, their permanent tusks, and they make mock prods at each other with the trunk base and face. The behavior apparently sometimes irritates the adults, and it is not uncommon to see a calf receive a resounding whack across its buttocks or dorsum, to which the calf responds either by submissively coming to heel to mother or by retreating to the company of the other calves.

At this stage, and through the next two or three years, the calf is expected to manage by itself in negotiating difficult terrain rather than receiving assistance from the mother's trunk. Thus the calf is sometimes seen to catch hold of the tail of its own mother or of an elder sister or aunt when clambering up a steep bank, hauling itself up by it. However, the older cows never hesitate to give a faltering four- or five-year-old a thrust in the buttocks with trunk base or tusks to push it up a bank, or help it out of a mudhole or riverbed. Sometimes they assist one another in the same way.

. . . Older female calves sometimes seem to exercise some sort of instinctive care over their very young sister and brother calves. In one case witnessed by the author a mixed herd fled when the sire bull was shot in a steep-sided valley. A six-month-old calf was unable to climb the bank quickly and was left behind, but an older female, a juvenile of about seven- or eight-years-old assisted it up the bank and waited for it. An elder brother, aged about ten years, also waited for them and then started to search for the best exit route, the young female and the baby following him.

Juveniles . . . may often be seen uprooting bushes and manipulating quite large branches for feeding, digging in the soil and prodding at bark, close beside an older cow in skillful but juvenile replication of her own movements.

On occasions where yearling and two-year-old calves have been captured, they have sometimes been found to be remarkably aggressive at first and to put up a good deal of determined and brave resistance, but usually readily accept human affection and authority in lieu of their mother's after a day or two. . . .

If a member of the clan is injured by a falling tree, falls into a pit or is injured in a fight or by a weapon, the others cluster around it and attempt to assist it to its feet using their foreheads, trunks and tusks. Two of the adult animals will then close in on either side of it, supporting it as it attempts to get away. . . .

How elephants "mourn" their dead

In a case where the animal is mortally wounded and cannot rise the other members of the herd . . . circle it disconsolately several times, and if it is still motionless they come to an uncertain halt. They then face outward, their trunks hanging limply down to the ground. After a while they may prod and circle again, and then again stand, facing outward. Eventually, if the fallen animal is dead, they move aside and just hang around . . . for several hours, or until nightfall, when they may tear out branches and grass clumps from the surrounding vegetation and drop these on and around the carcass. The younger elephants apparently also take part in this behavior. They also scrape soil toward the carcass, and then stand by, weaving restlessly from side to side, eventually moving away from the area. . . .

The author has failed to trace accounts of African elephants assisting their calves to swim, although this habit is well-known in the Asiatic species. However, it is known that when swimming across a river African elephants, like the Asiatic, place their calves on the upstream side. . . . African elephants are apparently

equally happy to walk on the river or lake floor if it is sufficiently shallow, holding the trunk aloft periscope-wise, the calves swimming alongside. Calves thus learn early to swim in places where the elephants customarily bathe in deep water, but it is not certain whether they can swim instinctively or whether they learn to do so with parental assistance. It may be that the physical movements of swimming are instinctive, but that the incentive has to be provided by adult initiative and confidence gained when the calf imitates and accompanies the adult.

Some of the sounds which an African elephant makes constitute auditory signals. There is no doubt at all that visual signals are also used as communication between elephants, just as visual warning signals are also given to intruders. . . .

The movements and attitudes of the ears, the position of the head relative to the body, the attitude of the tail, forefoot movements and above all trunk movements are all used as important visual signals. Two bull elephants meeting from different directions, even if both members of the same herd, make minor trunk and ear movements suggestive of some form of recognition and acceptance. Bulls challenging each other tend to advance with trunks raised and stretched forward, ears spread laterally.

Bull-cow meetings tend to be casual unless she is in estrus. Then a good deal of caressing, presenting the buttocks, feeling over the genitals with the trunk tip and mouthing each other's trunks occurs. Nervous and coy gestures by the cow, such as touching her ear orifice with her trunk tip, rubbing one hind foot against the other, touching her temporal gland, or "doodling" in the sand with her trunk tip or forefoot may take place. She may take hold of a piece of brush or a herbaceous plant and rub it up and down the inside of her trunk or slap it against her cheek, or she may pick up and drop sticks or branches, and walk about. If the suitor is serious, the chasing, buttock-prodding, slap-and-tickle behavior may lead to copulation. If the cow rejects these approaches she turns away, ignores him and goes on browsing. Bulls are said to go and roll if rejected or ignored.

Playing calves are very vocal indeed, and their squeals and squeaks as well as their visual signals are difficult to interpret beyond remarking that they tend to be somewhat excessive and random. When they display their ears they sometimes flap so hard and so far forward that they look exceedingly comical. They also give the impression of not always knowing how to hold their trunks during play, and their tails wag and twist constantly. They frequently run to their mother's side during a game, as if seeking approval or maybe just to check up on her position. They sometimes go up to older elephants and tweak their tails, or barge into their legs. This sort of behavior may elicit just a tolerant caress with the trunk from the older animals, or occasionally disciplinary reproval. One rarely hears any vocal response on these occasions from the adult. Even the sire bull generally seems to tolerate a limited amount of calf-play nearby if he has moved into the perimeter of the herd. . . .

Baby learns cleanliness from mother

Body toilet appears to be important to pachyderms. . . . . Cleanliness is learned initially from the mother, and she actively washes her youngest calves. As the calves grow older they share the same routine as the adults. Drinking and bathing often belong to the same occasion although, if possible, clear fresh water is used for drinking.

The elephant herd comes to the water as a group. Sometimes the sire bull arrives first at the waterhole and completes his drink and ablutions before the arrival of the rest of the family. Alternatively he may accompany them and drink with them.

As they approach the water, the leading cow enters first and stands in the undisturbed shallows, drinking deeply, her calf or calves beside her. The others line up on either side of her so that every elephant has access to clear undisturbed water. It is a marvelous sight to see a herd of 30 or more elephants all lined up, side by side, on a lakeshore in the red-gold glow of the setting sun, drinking their fill. When the drinking is finished, bathing begins. Some move deeper into the water and some move outward along the shallows. The babies are washed and scrubbed and the older calves play and splash, squirting each other like children with hosepipes, often accompanied by juvenile squeals suggesting pleasure and fun.

At last they emerge, clean and glistening, and

scramble up the slippery bank or in among the papyrus and other reeds. They may graze awhile among the lush green swamp foliage before moving on to drier ground. In drier areas they may move off into stands of gallery forest or, in montane areas, onto alpine moorland to browse. Wild elephants may drink and bathe at different times of the day and, especially in wet weather, may use a mud wallow during the heat of the day. . . .

An interesting account of the destruction of a cow elephant by an old bull in the Addo Elephant National Park [South Africa] was given in a report published in *African Wild Life*. The matriarch cow of the Addo herd, Ouma, had a large festering sore on her flank, some two-feet square. A younger bull known as Lanky kept assisting her to reach the drinking pool and stay with the herd. Later she was darted with tranquilizers in hopes of treating the wound. She fell but got up again and turned around. Hapoor, the sire bull helped her, along with a younger cow, to the drinking place. As the trio disappeared behind the bushes, Ouma again fell and Hapoor tusked her to death. He returned to the herd with one tusk covered with blood, and subsequent examination showed that he had stabbed Ouma four times, once through the temple, and three times behind the ear. The other elephants crowded round him, apparently sniffing the blood on his tusk, and then they went to the carcass, standing around it in the usual type of circle formed on these occasions while Hapoor stood beside them, trumpeting. The others sniffed and touched the carcass and then returned to their browsing, apparently accepting Hapoor's absolute authority. . . . The destruction of deformed or otherwise abnormal individuals at birth by the dam, of injured animals by fellow members of their herd, or of weaker individuals in fights for supremacy, is biologically speaking beneficial to the species. This is nature's way of eliminating the weak, superfluous individuals together with their disadvantageous heritable traits.

Nature is never very kind in the human sense, although strong social cohesion such as that which underlies the mutual assistance accorded within the elephant herds and clans may appear to us superficially to be kindness. The herd cohesion that drove Lanky, Hapoor and the other cow to assist Ouma initially only lasted as long as she showed some response and survival drive. In her final collapse this tenuous cohesive urge was in some way snapped between them and Ouma herself.

. . . Elephants are naturally peaceful creatures with few real natural enemies. As with many other species the first reaction of the individual elephant or herd to real or imagined rivalry or danger is to enlarge the image of itself presented to the would-be intruder. This is achieved by raising the head and trunk, thus increasing the apparent height, and extending the ears, thus increasing apparent breadth. Threatening gestures may be made, such as scraping up soil with the forefoot, weaving from side to side, and shifting the weight restlessly from right to left and left to right forefoot. The tail may be raised and twisted or may wag with irritation. A shrill scream may be emitted from the trunk, all the actions together being calculated to intimidate the intruder. If the intruder is located and recognized, but fails to retreat, the elephant may make a mock charge with the trunk held high. If the enemy backs away the elephant may conclude the mock charge after about a 30-yard run, blow a puff from its trunk, wheel around and amble off. . . .

A baby eagerly suckles from teats between its dam's forelegs. It takes two years to wean.

Hunters' narrow escapes cited

If the enemy fails to retreat or responds by counter aggression, the mock charge may turn into a serious attack. Then the trunk is thrown down and somewhat rolled under to one side, the head lowered and the tusks directed at the intruder. The elephant may scream or growl as it thrusts home the attack. In some remarkable hunting experiences men have survived attacks and described the elephant's technique.

Sometimes the elephant simply grabs the intruder with its trunk and hurls him away sideways. Fortunate survivors usually owe their lives to having been thrown into a thorn bush or up into a tree where the angry elephant fails to find them. In one notable case, Carl Akeley, famous museum collector and hunter, was knocked to the ground and jabbed with the tusks which in this particular elephant were rather short, straight and wide apart. The tusks entered the ground on either side of Akeley's body and not only failed to pierce him but also prevented the now kneeling elephant from crushing him with the base of the trunk. Thinking the victim dead the elephant stood up, sniffed him over and went away.

Less fortunate victims have been stabbed and/or crushed to death, the elephant kneeling on and then pawing over the victim's remains with the forefoot. In one tale recounted to the author the intended victim lay unconscious, and . . . found himself buried under a heap of soil and branches. . . .

A sick or injured elephant is much more likely to be aggressive than a healthy one, and a herd leader, especially a herd matriarch, tends to be quick to make and drive home aggressive gestures. Similarly, cows associated with companions that are calving or have very young calves are quick to drive off intruders.

Matriarch charges passing cars

An interesting group of four cows and two older calves had taken up residence in an abandoned army camp where the writer and her assistants were studying elephant diseases in Kenya in 1965. They were extremely aggressive and we treated them with the utmost respect. The cows were pregnant, and while we were there one calf was born. Everytime a car passed their favored thicket when the elephants were "at home," the senior cow would rush out on the track or would run along in the bushes beside the track to chase it off. If the car stopped she would scream at it, flap her ears and charge it. Not wishing to have the car or the elephant damaged we would drive off as quickly as possible, the angry cow following for about 100 yards before relaxing, satisfied with the effect of her protective and aggressive action. . . .

There is no doubt that some elephants turn killer. There can also be little doubt that such behavior is extreme and unusual and stems from injury, chronic illness or persistent disturbance by man. Such elephants attack almost any moving object in sight with intent to kill. They overturn vehicles, attack trees, chase other animals and are extremely vicious. . . . any genuine rogue elephant of this type must be regarded as exceptional, and treated accordingly.

Elephants normally live harmoniously with other wild animals. . . . They take little notice even of predators such as lions, hyenas, wild hunting dogs and crocodiles as long as the elephants have no young calves with them. It is not unusual to see elephants browsing quite peacefully in the vicinity of a pride of lions which may be resting in a shady thicket or near a hill. . . . However, they are not always quite so tolerant of smaller animals, and one supposes that this may be a natural and necessary reaction primarily developed with regard to snakes and driver ants. . . .

African elephants are individually extremely adaptable to remarkable ranges of temperature, altitude, latitude, terrain, humidity, isolation and diet. They are also very hardy and can survive climatic extremes such as drought, flood, heat waves and snow for considerable periods. In captivity they adapt readily to confinement and human management.

However, prolonged restriction interfering with the natural tendency to migrate, prolonged isolation, prolonged restriction of the dietary habits to grazing instead of browsing, and of the amphibious habit to a solely terrestrial one, appear to be the kind of changes that reduce overall viability. In terms of the species as a whole, in . . . its total African environment, the minor elephant population explosions currently occurring in a few protected areas are relatively insignificant . . . for they tend to conceal the reduced vitality and average longevity characterizing these populations.

In attempts to solve the problem of why mastodons and mammoths became extinct, perhaps we should seek an explanation in terms of their basic need to migrate and their adaptability limits. Proboscideans have always had this urge to migrate. They have turned up at some time or another on every continent of the world except Australia and Antarctica. Adaptable as they may be individually for a lifetime, and as populations for a few generations, radical environmental changes which occur simultaneously with curtailed migration appear to be disastrous.

We may speculate hopefully as to the temporary value of preserving a few controlled populations of African elephants in Africa's living museums (or natural parks) and in zoos. But in the long term it is difficult to believe that they will survive indefinitely unless fully domesticated, trained and worked in a manner which could to some degree compensate for their lost natural opportunities for adequate physical exercise and travel.

Trunk raised, great ears spread, a matriarch
sniffs danger while calves crowd below.
An angry charge is apt to follow this attitude.

One of two largest coins honors Ferdinand III of Bohemia. Smallest, 1/32 ducat is from Germany. They are shown 1.5 times actual size.

Photographs by Lee Boltin

By Herman Schaden

The greatest group of coins ever gathered by one man

The beauty of Josiah Lilly's 'play house' collection is a shining tribute to one of the world's great collectors.

It began as a search for doubloons and pieces of eight, the stuff of pirate ships and sunken treasure, and evolved into the Josiah K. Lilly Gold Coin Collection, the greatest of its kind ever assembled by one man. After adding its 6,125 pieces to the coins it already had, the Smithsonian Institution has 400,000 priceless specimens.

Behind the acquisitions was an unusual man. Josiah Kirby Lilly II shared with his brother, Eli, directorship of the pharmaceutical company founded by their grandfather, also named Eli.

Josiah was an insatiable reader. His first love was sea stories, and from it grew many of his amazingly varied collections: ship models and maritime objects, rare books, stamps, paintings, precious gems, antique swords and firearms, miniature soldiers—in addition to his coins.

Until his death only a few associates and friends knew how Lilly had spent a small fortune developing his collections. Typical of the man was the private museum he called his "play house." He designed it himself and in 1958 had it built. Shaped as a cross, it held most of the collections and had a vault at the intersection for the coins.

Lilly's attachment to his hideaway never diminished. "Even in the last months of his life, when he was suffering from diabetes, Mr. Lilly would spend 12 to 14 hours a day at the museum while he continued to read and improve his collections," says his executor, Paul E. Rawley, vice president and senior trust officer, Merchants Bank and Trust Company, Indianapolis.

The coins were gathered under a cloak of secrecy that would thrill any mystery lover. For 16 years the coin world was baffled, wondering about the Mr. X who was hiding in his hoard the finest coins from many outstanding public auctions and private sources.

Not until his death on May 5, 1966, was the secret out. Then came the story of how one day he had visited Stack's Coin Company in New York, searching for the treasures of his beloved sea stories. From pieces of eight he went to American eagles, and the quiet, undercover collecting game was under way.

"We knew many of the most important coins were dropping out of sight," says Dr. Vladimir Clain-Stefanelli, who, with his wife, Elvira Clain-Stefanelli, directs the Smithsonian's numismatic collection. "But no other dealer could tell us where they were going.

"Later, of course, we learned that Mr. Lilly had dealt exclusively with Stack's. His agent operated under strict instructions of secrecy.

"Once or twice a year Lilly would have a shipment of coins sent to Indianapolis, and he would select what he wanted and return the rest. He was most meticulous, would never buy a coin until he had read up on its history and frequently improved on a given piece when a better example of it was offered."

Dr. Clain-Stefanelli started the moves that assured the collection for the Smithsonian when liquidation appeared imminent. The Indiana delegation steered a bill into Congress by which the United States would buy the coins.

During congressional hearings Abraham Kosoff and Hans M. F. Schulman, widely known professional coin dealers who appraised the collection, spoke rhapsodically of its worth. "I have never seen anything like the Lilly collection in all my experience," said Kosoff.

Schulman warned it would be catastrophic to sell

the coins publicly because they would be bought by foreign agents and dispersed throughout the world, never to be reunited.

Rawley's statement to a House Judiciary Subcommittee reflected his personal enthusiasm: "Josiah K. Lilly may well have been the greatest collector that ever lived. Upon each of his magnificent collections he expended his own personal energies, intellect and resources. The reaction of every expert employed by the executor has been one of astonishment as to the impeccable taste, scholarly approach and energetic dedication which Mr. Lilly brought to bear."

While Congress pondered, Rawley squirmed. He wanted the coins to go to the Smithsonian, but his first obligation was to liquidate the estate responsibly. "I can tell you now," he recently revealed, "that while Congress had the matter under consideration, a private collector offered $4.5 million for the coins. It was a tempting offer, hard to resist because of the uncertainty of how the legislature would react."

Eventually Congress passed the bill, and the coins were bought for $5,532,808 (tax on the assessed valuation was $4,261,802). On June 14, 1968, a truck rolled up to the Smithsonian with a 600-pound delivery of 51 black-morocco leather, velvet-lined cases in which Lilly had kept the coins.

Now you can see them lined up in tidy display cases, row on row of them, coins like golden soldiers marching from the age of Pericles to modern times. Mrs. Clain-Stefanelli has organized the exhibit, with a layout designed by the Smithsonian's Steven Makovenyi, in easy-to-follow groupings. There are 1,227 different U.S. gold pieces, examples of all kinds ever struck. There are 1,225 Latin American coins—an unrivaled galaxy.

The 3,227 European coins range back to medieval times. There are 240 Asian, African and Indian pieces and about 200 of ancient Greek, Roman and Byzantine origin. In the ancient coin group is an octadrachm struck in Egypt by Ptolemy VI (180-145 B.C.) for the tenth jubilee of the marriage of Cleopatra II. A coin of Alexander the Great (356-323 B.C.) shows the helmeted head of Athena.

The unique Brasher half doubloon, the earliest U.S. gold piece, is dated 1787. It was privately made by Ephraim Brasher, a goldsmith and silversmith living in New York.

The Smithsonian is especially elated by the 153 pioneer and territorial pieces from gold-rush days, including 41 unique bars, an irreplaceable series. Before the Lilly Collection came, the Smithsonian had only two such gold bars.

Many coins are souvenirs of North Carolina, Georgia and California gold rushes. A particularly well preserved one-dollar piece was struck in Dahlonega, Georgia, in 1861. The governor had seized the mint and gold dollars were struck under the government of the Confederate States.

In 1848 about 230 ounces were sent to Secretary of War William L. Marcy. The first shipment from the California gold rush, it was turned over to the mint and made into quarter eagles ($2.50) with the designing mark "CAL" on the reverse side.

"America's most beautiful coin" is the experimental 1907 double eagle ($20) gold piece, an artistic triumph and practical failure. President Theodore Roosevelt met with sculptor Augustus Saint-Gaudens and both agreed that America's coinage was rather homely compared with that of the ancient Greeks. "I want to make a suggestion," wrote the President later. "It seems to me worth a try for a really good coinage; though I suppose there will be a revolt about it!" Roosevelt's idea for a coin was to have it with an extremely high relief, and a raised rim to protect it. Saint-Gaudens followed through and made a coin that is lovely to look at, unhandy to use, and today a rare collector's item. (see pp. 48-49)

Three cases hold coins of singular beauty and historical importance. Here are two of the largest gold coins ever minted, 100-ducat pieces, each 3½ inches in diameter, a quarter of an inch thick and weighing 12.3 ounces. In contrast the tiniest coin is a 1/32 ducat piece 1/3,200 the size of the big fellows.

Our photographs show (p. 42) one of the giant pieces; the other was struck in 1621 to commemorate the victories of Sigismund III of Poland.

Extremely rare is a memento of the Thirty Years War, a ten-ducat piece turned out by the Swedes while

Herman Schaden, a reporter for the Washington Evening Star, *has constantly covered the Smithsonian.*

On this 1839 five-pound piece, Queen Victoria, cast in a theme from the poet Spenser, guides the British lion. Never accepted for mintage, it gets high marks artistically.

From Latin America, the bar was issued in Serro Frio, Brazil, during Prince John's regency. With it a cob eight-escudo piece struck in 1739 in Lima under Philip V of Spain.

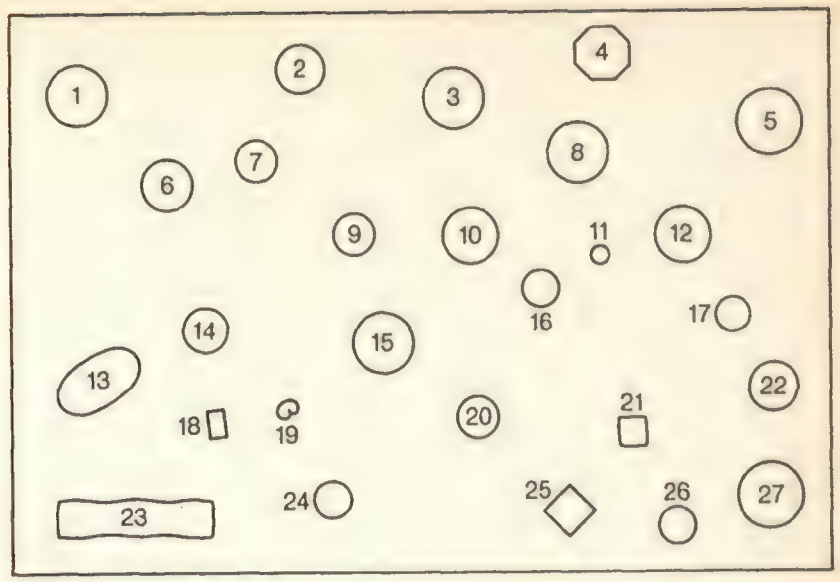
they were occupying the Prussian city of Erfurt in 1645. It bears the likeness of Queen Christina.

An Italian 12-zecchini piece shows the doge of Venice, Paolo Renier, receiving the cross of St. Mark. The doge was in power from 1779 to 1789.

From England comes the pattern five-pound piece made in 1839 by William Wyon shown on page 45.

Second only to the United States' collection in historic and numismatic worth are the 1,225 Latin American coins, of which 665 are large eight-escudo pieces. Representative is an eight-escudo piece with irregular planchets struck in Lima, Peru, in 1739.

Lilly departed from gold only long enough to acquire a fascinating set of Russian platinum coins, which he particularly enjoyed showing to the few people invited to see his coins. Smithsonian visitors see platinum pieces of 12, six, and three rubles, one of two sets struck in 1839 in the time of Czar Nicholas I. The Russians tried to circulate platinum coins after the metal was discovered in the Urals in the early



A sampling of coins: 1. Brazil, 1727, 20,000 reis; 2. Würzburg, 1707, two ducats; 3. Holy Roman Empire, under Matthias, 1608-19, ten ducats; 4. Transylvania, 1660, ten ducats; 5. Transylvania, 1616, ten ducats; 6. Peru, 1713, eight escudos; 7. United States, 1787, half-doubloon designed by Ephraim Brasher; 8. Transylvania, 1605, ten ducats; 9. Peru, 1739, eight escudos; 10. England, 1668, five guineas; 11. Pondicherry, French India under Louis XV, 1715-74, one pagoda; 12. Russia, 1702, eight ducats; 13. Japan, 1837, one koban; 14. Mexico, 1720, eight escudos; 15. Annam, under Thieu Tri, 1841-47, phi long; 16. Leghorn, 1718, pezza d'oro della rosa; 17. Paderborn, Germany, 1767, five talers; 18. Japan, 1859, ichi-bu ban kin; 19. Siam under Phra Chom Klao Mongkut, 1851-68, one tical; 20. Augsburg, 1745, two ducats; 21. Hindustan, 1569, one mohur; 22. Saxony, 1711, five ducats; 23. Mexico, 1744, 281.77-gram bar; 24. Awadh, India, 1819, one mohur; 25. Salzburg, 1523, two ducats; 26. Russia, 1758, two ducats; 27. Salzburg, 1687, 20 ducats.

1800s, but finding them to be unpopular because of their lead-like appearance discontinued the experiment in 1845.

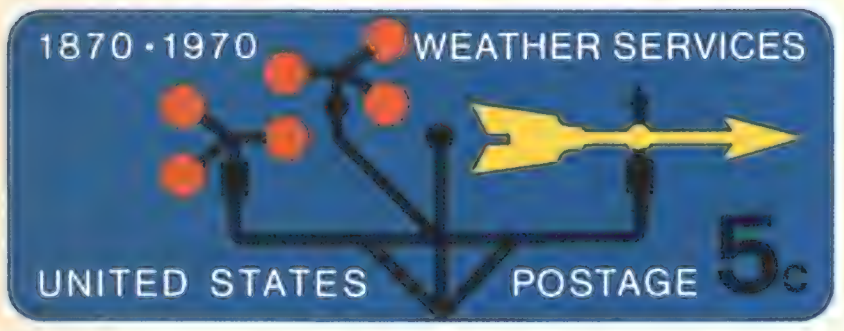
Josiah Lilly combined the intellect and patience to perfect his many collections. Now many of them have been dispersed. But the soldiers can be seen at the Heritage, Sandwich, Massachusetts, where Josiah K. Lilly III displays them. Thanks to the wisdom of Congress, the coin collection belongs to all of us and can be seen by all at the Smithsonian.

"America's most beautiful coin," shown here eight times actual size, was an artistic triumph but

unhandy to use. The sculptor was Augustus Saint-Gaudens and the job was suggested by Theodore Roosevelt.

By Bernard L. Wiggin

A weatherman who has been called the 'most useful man of his age'



The man who developed the weather service would enjoy the satellites and computers that serve it today after a century of operation. They are indeed a sophisticated advance over what started as a collection of telegraphic reports. But Albert James Myer was a man for innovation and advance. It was typical of him that he was already generating predictions of weather to come when describing the weather at hand was still a challenge.

In hindsight Myer seems an unlikely founder for the organization. After being a mediocre college student he became a telegrapher to pay the bills of medical school. The strain of study produced a breakdown shortly after graduation, but he recovered to be an Army physician. Eventually the idea of communication triumphed over medicine, and he was head of the Army Signal Corps when President Ulysses S. Grant signed the law that authorized the weather service. Myer took command in November of the same year, 1870, and put the system in operation. By the time he died in 1880 weathermen around the world were coming to study it, and one obituary called Myer "the most useful man of his age."

By that time much had happened since a nervous Sergeant Slater in Buffalo, New York, recorded in the station log: "Opened station this Tuesday morning, November 1st, 1870. Reports a little mixed up. Genl. Myer in town. Ordered that we should correct any errors in messages." Why was the boss in Buffalo instead of Washington? He had come back to his hometown for opening day.

Myer was born on September 20, 1828, in Newburgh, New York, but shortly afterward was brought to Buffalo by his parents. His mother died, leaving Albert to be reared by a straitlaced maiden aunt who gave her nephew genuine love; at the same time she taught him the severe mores of a God-fearing Scottish home. There were daily Bible readings and daily prayers, practices Myer continued all his life.

To a small boy Buffalo was about the liveliest city in the United States during the 1830s. He could have heard the main topics of the day: more Indian land was being taken over; traffic on the Erie Canal was at a peak; the original Christy Minstrels sang in a Canal Street saloon while just outside a sizable proportion of the nation's violent crime was taking place. To balance the rough and raw features, Buffalo had cultural assets including public schools patterned by the disciplinarian Captain Alden Partridge and one of the first excellent public libraries.

Geneva College (now Hobart and William Smith) further shaped Myer. It was one of the first to abandon classicism for the pragmatism that became identified with America. Myer as an underage freshman just turned 14 spread himself thin over studies and the campus sports of sailing, horseback riding and faculty baiting. His major interest was in the sci-

Albert Myer's army service began in 1854
with several years at Forts Davis
and Duncan along the Overland Trail.

Joseph Henry posted telegraphed reports at the Smithsonian, but the Civil War permanently stopped this service.

ences, languages and mathematics, and top grades eluded him as he sought for five years to plumb the limits of each subject.

When the University of Buffalo Medical College was founded, graduate Myer returned to become a telegraph operator nights and medical student daytimes. The medical degree was conferred in 1851.

From the physical breakdown that followed Myer's nine years of intense work to get an education, a complete rest was ordered. He did rest for awhile; then he practiced medicine in Charleston, South Carolina, and Monticello, Florida, until the spring of 1854. He applied for a commission as assistant surgeon, U.S. Army, before he returned to Buffalo with his health restored.

During the next 15 years he served as assistant surgeon in Texas at Fort Davis and Fort Duncan on the Overland Trail in the heart of Apache country; married his grammar-school sweetheart, Kate Walden; became independently wealthy when his father-in-law, Judge Ebenezer Walden, died in 1857; presented a military signaling system to the nation in 1858 (refusing to accept a generous cash award for it from Jefferson Davis, chairman of the Senate Military Committee); transferred to Washington and took charge of the signal office in 1860; served with valor in the Civil War and was promoted from major to lieutenant colonel for meritorious service and at the same time trained signal units to serve with every military department; refused to bow to Secretary of War Edwin M. Stanton's politics and hence was shelved midway in the war. A fighting comeback engineered by Congressman James A. Garfield restored Myer to command of the Signal Corps with promotion to colonel, together with decorations earned in combat.

He was reorganizing the corps when General Halbert E. Paine, congressman from Milwaukee, reported out a bill to create a federal weather service, possibly resembling the one Joseph Henry originated at the Smithsonian Institution before the war. Henry's service had been very popular, but had ended never to resume when the war cut off the telegraphed reports.

Paine was well informed about weather, having studied it at Western Reserve College under Professor Elias Loomis, expert researcher who was formulating physical laws to make the art of weather forecasting practicable. A constituent, Professor Increase A. Lapham, had sent him a clipping that catalogued all the Great Lakes marine disasters of the last year—1,914 vessels lost and 209 lives—and a long-winded memorial, which, reduced to the message, said, "You ought to do something about this."

Myer also had a good fund of weather knowledge. As a telegraph operator he had participated in the daily exchange of weather reports from offices on the circuit. More important, much weather is made at Buffalo's doorstep; gales, heavy snowfalls and wind-driven storm surges were common experiences during his most impressionable years.

It didn't take two general officers very long to convert an indefinite proposition to one couched in responsible language. Besides, Myer knew what he wanted. Paine was pleased when a Joint Congressional Resolution was quickly passed and signed by the President on February 9, 1870.

Low budget and indefinite extension

Myer the Scot explained to the Congress why he was asking only $15,000 for the remainder of the first year and only $25,000 for the entire second year of the new service. During the spring and summer of 1870 he planned to create a service that would be essential and "capable of indefinite extension." He solicited and received suggestions from scientists all

The author, a Weather Bureau meteorologist, was in Buffalo from 1945 through 1965. He has also been a staff weather officer for the Army.

over the world. He wrote, "It is a pleasant duty to refer to the universal goodwill and ready cooperation with which the different scientific establishments have responded to the requests of this office."

The Fort Whipple (now Fort Myer) Signal School in Arlington, Virginia, was expanded to train weather observers. Myer set a pattern in recruiting that has been observed in part by the weather services down to this day. He wanted the top quality recruit in every case. For incentive he insisted that successful graduates from his school would immediately acquire the grade and pay of sergeant; later, after proven performance, a commission would be made available each year for the one who had shown the most meritorious service.

Personnel, offices and telegraphs

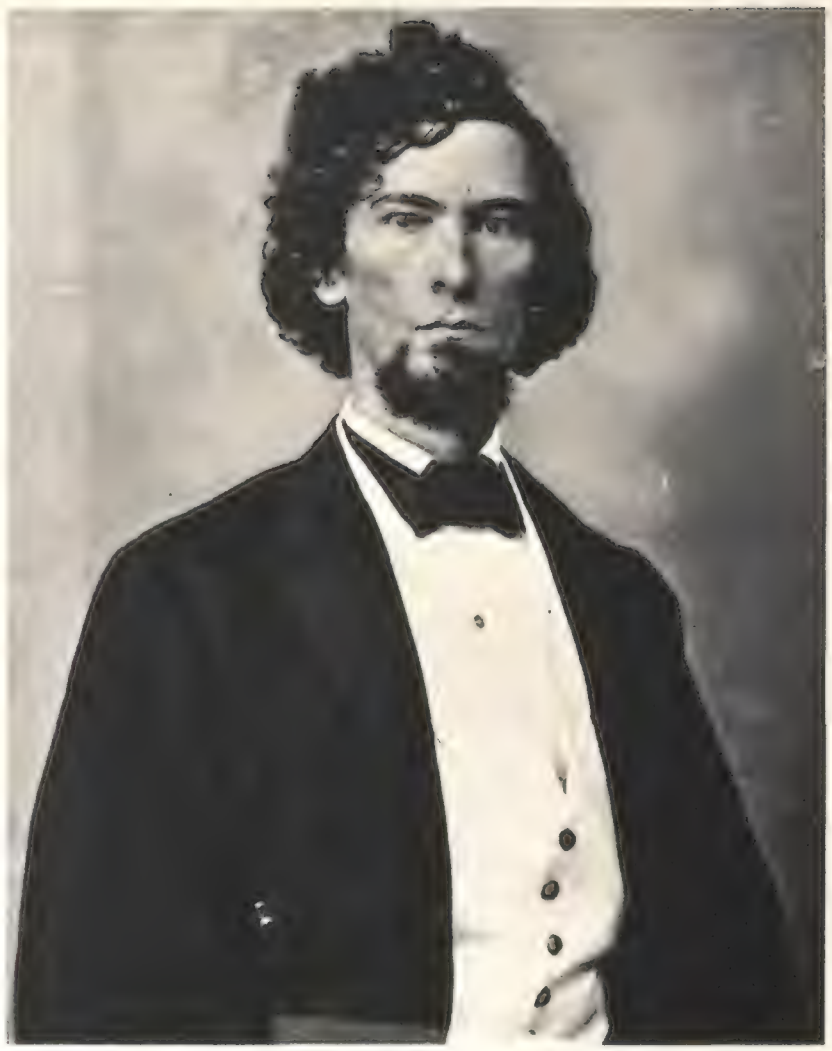
During October 1870, 25 observer-sergeants went on detached duty at 25 locations spread out from Boston to Omaha.

But Myer did not always get recruits of the quality he wanted. Nearly a third of the original assignments had to be replaced during the first full year of operation, mostly in the larger cities. In his hometown, Buffalo, Myer kindly reported the transfer of Sergeant Slater "to a less important station" because he "did not have enough energy." There were transfers and replacements for drunkenness, disorderly conduct, "personal difficulties with manager of telegraph office," incompetence and "gross irregularities."

Volumes of instructions had been drafted and issued on how to observe, record and report the weather, most of which followed the rules evolved by Joseph Henry for his Smithsonian observers. There were also details on how to set up an office. Rented quarters (one room) in the business district could not exceed $18 a month; "office furniture will be of the plainest kind"—a desk not to exceed $20; a pine table no more than $6; two chairs at $2.25 each; a stove and a pair of spittoons.

Telegraph circuits were set up by Western Union, Northwestern and International Ocean Telegraph companies so that all reports could be in Washington and selected lists of reports relayed back to city offices in less than 90 minutes. Forecasts were not planned at this time in accordance with Myer's desire to move slowly in order to move surely. He believed in the inherent intelligence of people who, if given the distribution of current weather accurately, could figure out its movement and how they might expect it to affect them later.

Never, anywhere, had a weather service of such magnitude been attempted. When its intricate ma-



Congressman Halbert Paine, with Myer's help, wrote the resolution that authorized start of a nationwide network.

Cleveland Abbe and Western Union produced pre-Myer maps like this, which shows temperatures, clouds, winds and precipitation.

Founder of the weather service

chinery clicked into action, Myer was in Buffalo to observe it and note the reaction of the using public—the shipmasters, merchants and other citizens who crowded into the small office at Main and Seneca streets. The time was propitious. Newspapers were still carrying accounts of the disastrous effect of an end-of-October storm.

Twenty weather reports were received that first day and an average of 22 per day that first week. Myer, satisfied that his system had proved itself, was ready for the next step. He wired Professor Lapham to meet him in Chicago; he had decided, as the good physician would, that the risks of making errors would be greatly exceeded by the benefits of marine weather forecasts.

Lapham was hired November 8, 1870. The first marine forecast was issued from the Chicago center that day. But Myer, not Lapham, was responsible for it. Professor Lapham himself in a parenthetic note said of the first two forecasts, "The telegrams were ordered by the Chief Signal Officer of the Army, then in person at Chicago."

The station log shows that on November 14 Myer issued a storm warning from Buffalo. Why had Lapham failed to take the initiative on this warning? This may have been one of the several times he was away from his post at Chicago for personal reasons. He did not have Myer's sense of personal responsibility for service. In most historical accounts, including one off the press in 1970, Lapham is credited with all of the early marine forecasts, which were issued, in fact, by Myer. Lapham was gently shelved at the end of the Great Lakes navigation season after barely five weeks of forecasting duty.

When the Cincinnati Astronomical Observatory was liquidated, its displaced director, newly married Cleveland Abbe, became desperate. He had dabbled unsuccessfully (in spite of later publicity to the contrary) in two local weather services. Disappointed in Lapham's performance at Chicago, Myer probably had mental reservations as he hired Abbe, who reported for work January 3, 1871, but there was little or no choice; service meteorologists per se were nonexistent at the time.

Abbe was somewhat of a weakling. To realize the best of his talents he needed the iron discipline of Myer. When the two were combined, as they were in early 1871, history was made; the National Weather Service became a success almost overnight. Shortly, and for the first time, metropolitan newspapers like the New York *Herald* began to publish the complete Weather Bureau daily output.

In a typical Myer gesture Abbe was promoted with a generosity not then known to federal civilian employees; with the promotion he became the highest paid of them all.

Success in public service breeds demands for more service. Cities wanted daily river stage reports and flood warnings; farmers demanded services that were never contemplated in the original plan but which did fit Myer's system capability of "indefinite extension." Forecasters were trained and added to the staff beginning with Professor T. B. Maury in June of 1871.

Although Abbe was eased out of forecasting, his ability to write lucid prose was useful to Myer. Abbe's essay, "The Practical Use of Meteorological Reports and Weather Maps," provides more sane information about weather than one obtains 100 years later from many of the current television shows or from "popular" weather feature stories.

Research, cooperation and growth

Myer with his public-service program acclaimed throughout the country (a minor unfavorable opinion was printed in Boston) was now free to pursue his ideas on research, international cooperation and growth of his organization.

He had always had an international outlook. In his lonesome quarters on the Rio Grande, he had studied foreign languages so that one day he might be able to communicate with people of other lands. An entry in the Buffalo log of November 12, 1870 had recorded his conviction that reports should be exchanged with Canada. A year later an exchange was worked out between Ottawa and Washington.

The first weather-observing mountain stations were established on Mt. Washington, New Hampshire, and Pike's Peak, Colorado. Instrumented balloon flights were made, both in the United States and Europe. Two polar expeditions carried observers from Myer's

office; one on the grand scale was in the planning stage; creative excitement, which pervaded the Washington headquarters, was described by a contemporary journalist: "The building in which General Myer and his staff are located, on G Street, actually bristles with meteorological insignia, the roof being a very grove of cups and balls and flags and mirrors (black mirrors to catch cloud reflections) and telegraph wires and barometers and 50 other ometers. Wires from the four corners of the earth converge at this point, and not content with the results obtainable by a single roof, the General has compelled the roofs of his immediate neighbors to pay tribute in the form of accommodations for the numerous wind, water and weather gauges."

A showering of honors

All nations were solicited to extend the boundaries of the weather researcher's maps by making simultaneous observations each day at 7:35 a.m., Washington time. Myer's idea was adopted unanimously at the International Meteorological Conference in Vienna, September 1873. In 1875 the first international weather bulletin was issued from Myer's office, followed in 1878 by a weather map covering the northern hemisphere.

TIROS and NIMBUS, satellites which help scientists make reports, carry on today in the Myer manner as they survey world weather and make their observations available to all nations. The Weather Service headquarters in the Gramex Building, Silver Spring, Maryland, has a rooftop antenna system and other displays that make it a modern updating of what Myer had in 1870.

Sir William Thompson in his presidential address to the physics section of the British Association, September 7, 1876, referred to Myer affectionately as "Old Probs" (Probabilities) as did most of the world press. Myer credited his weather forecasts with an accuracy of 80 percent, not far different from today's.

Honors were showered on Myer from scientific groups throughout the world. Russia sent a naval captain to the G Street laboratories to learn how American weather instruments were calibrated. German minister Schlöser wanted to know how Myer got his daily weather maps published so quickly and into the hands of the using public.

But then there was Myer's failing health. Nine years of overwork in college and medical school had left calcified scars on his lung tissues; ten years of driving himself and his assistants to make the national weather service work was to cost even more.

Nostalgia brought him back to Buffalo in the late spring of 1880. The Congress, which had made the past few years miserable by withholding funds for the necessary expansion of his weather system, now heard how grave his illness had become. They promoted him forthwith to the long withheld permanent rank of brigadier general. It proved to be a belated gesture.

Myer died August 24, 1880, in Buffalo's Palace Hotel overlooking Lake Erie. He was surrounded by his family—Kate and their six children—and by a special staff of medical friends. He had truly expended his life in service to his country. *The New York Times* headlined: "The Weather Bureau: General Myer's Remarkable Creation: A Perfect Organization."

The American Meteorological Society, the national organization of professional weathermen, has numerous honors in the names of lesser lights, including the capricious Cleveland Abbe, but none for the man who first planned, then made the national weather service work. To paraphrase the suggestion of Professor Lapham that started things moving 100 years ago: Somebody ought to do something about it.

Albert James Myer was painted by George P. A. Healey at the height of his career.
Painting is on loan from the Smithsonian Institution to Fort Monmouth, N.J.

Listening to the ringmaster bellow, "Ladees and gentlemen," spectators await the next act.

Daring aviators head for the wild blue yonder aboard an unlikely looking flying machine.

"Indians are my favorites. . . ." A solemn chief smokes his peace pipe before a young fan.

Photographs by Charles Phillips

By William Accorsi

'When I crack the whip my little circus comes to life'

On many-tiered platforms, acrobats, strong men, western heroes "are just there, giving their all."

Thousands who have seen Accorsi's brightly painted figures in shops and museums consider this one of the great shows on earth

As a sculptor, I call my display Accorsi's Oom Pah Pah Circus and Wild West Show. It consists of handmade wooden animals, acrobats, clowns, cowboys and Indians, ringmasters and spectators. They have been exhibited in the Smithsonian Museum Shops. I want my circus to celebrate life and to sing it. Corny? Yes. Intellectual? No. Some of my observations follow:

Fat is beautiful—In the beginning, I decided I would not have "fat" people in my circus. Then after several months I did a fat lady, and she was charming. The fat lady concept began to grow. Now there is a "fat is beautiful" area in the Circus.

The weight lifters—In this circus, incredible sums of weight are lifted. When I was a boy, a carnival came to town and offered a prize to anyone who could lift the fat lady. My father and mother went one evening, when unfortunately I stayed at home. Next day I heard that my father had lifted the fat lady and won the prize. This has to be one of the more remarkable events that I have missed. I still try to picture the feat.

The Wonder Boys—Some of the Circus people have no names; they are just there, giving their all. However,

the Wonder Boys are stars. They are a balancing act and have all kinds of hokey positions. Each one is different. Some are black, some blue. One is a minister.

Tom Thumb—The only person in my circus who comes from circus history is Tom Thumb. There was once a fat lady called Alice from Dallas. She is not in my circus, but I love her name.

The Indians are my favorites. As I worked on them, the word "wild" kept coming into my head—"wild" as hippies use the word. I could never get over their ceremonial elegance. I am told that Europeans are fascinated by our Indian lore.

I found myself putting cowboys next to Indians. Did you know that many palefaces joined Indian tribes, but there were few recorded examples of Indians leaving their tribes to live with whites?

Of course, in the Wild West Show the cowboys ride the black horses and the Indians ride the white ones. Some of the cowboys are bandits, sheriffs, dudes, Hollywood cowboys and plain cowpokes. The Indians are more or less chiefs and braves.

People who help—A bunch of friends have been helping me build the Circus—teachers, artists, lawyers, doctors. They sand, paint and lacquer the figures. We meet one evening a week. For some of the figures, I determine the colors and mix them. For other figures, I tell my friends to use whatever colors they wish. I reserve repainting rights. My only rule is that no mistakes are ever made. Someone will slop paint on a figure's foot and say, "Oh, I made this dumb mistake."

"No mistake," I will say. "His foot looks nicer that way." And so it goes. Not one mistake has ever been made.

I have never been to the circus—I am more interested in the concept of reality than in reality itself. Much doubt exists about the survival of the circus. It will survive because it is a mirror of certain desires and fantasies. Someday there will emerge the adult circus —when there is a need for it.

The future—What will I do with the Circus and Wild West Show? I don't know. But I think I will work on it for a bunch of years, maybe 20, maybe more. I will not show it in galleries. In museums, yes. In stores, yes. People go to stores.

While circus rings whirl in a grand finale,
imperturbable weight lifters hoist 14,000 pounds.

By Michael J. Bandler

Robert Ardrey– 'I call myself an evolutionist'

Can a former Hollywood screenwriter find happiness as the lionized author of controversial books? You bet he can!

Consider: a forty-five cents an hour lecturer on anthropology at the 1933-34 Chicago World's Fair; a protégé of Thornton Wilder and author of seven produced plays of his own; a vastly successful Hollywood screenwriter; one of the most provocative and controversial thinkers on evolution and behavior. Consider Robert Ardrey.

Interviewed recently at Atheneum, his publisher, the author discussed his strangely split career. When his *African Genesis* was published in 1961, it was greeted as "wildly wrong" (*Time*), "potentially dangerous" (*Saturday Review*) and boldly speculative—"a dangerous practice for an amateur scientist writing a popular presentation of technical material" (*The New York Times*).

Robert Ardrey's experiences in the theater and in Hollywood occurred during what he calls "my Rip van Winkle period"—the 20 years from the time he lectured on anthropology in Chicago to the rekindling of that flame within him in Johannesburg in 1955. From evidence accumulated mainly by a South African anthropologist, Dr. Raymond Dart, Ardrey was able to articulate the theory that our immediate forebear was a man ape called *Australopithecus africanus,* and that this creature very likely was a killer.

Michael Bandler's article on Dr. Ruth Patrick, who diagnoses water pollution, appeared in August's SMITHSONIAN. *He works in Washington.*

"The period when I was involved in anthropology in Chicago made a great difference when I ran into Dart's evidence," he explains. "It meant that I did know a little bit. . . . I knew nothing about the *Australopithecinae,* but I knew something about paleontology and statistics. Thus I could meet this evidence with at least a kind of crude intelligence—enough to say to myself, Hey! This is something!—and then later go back over it to bring myself up to date."

Ardrey formulated that man's predatory nature is inherited by every generation, rather than learned. Venturing into the darkest recesses of the animal world, he emerged with colorful examples of the striking similarities between the instinctive behavior of *Homo sapiens* and other members of the animal kingdom in any given number of situations. He believed then, and continues to hold that "If you're going to know all about a man's past, you've got to study the predators—lions, hyenas, hunting dogs—because that's what we were."

In 1966, *The Territorial Imperative* appeared. Once again, Ardrey asserted that instincts are innate. "We act as we do," he wrote, "for reasons of our evolutionary past, not our cultural present, and our behavior is as much a mark of our species as is the shape of a human thighbone or the configuration of nerves in a corner of the human brain." Furthermore, one of the key instincts possessed by man is a deep need to establish and to defend a specific area of space—a territory. Man's bond with the land is stronger than his pact with the woman sharing his bed.

Bad reviews meant public notice

This time, critical reaction was just as swift, but somewhat more complimentary. If the reviewers failed to fling superlatives, neither did they hurl brickbats. Ashley Montagu did assemble a collection of essays to refute the theories on aggression posed by Ardrey and Konrad Lorenz, but it failed to make an impact. Ardrey recalls, with some relish, that the reviews of *Man and Aggression* were "so bad that I got a terrific pleasure out of reading all of them. I was thrilled by all the indirect attention I received."

This fall the latest of Ardrey's quadrennial efforts has surfaced, renewing once again the familiar debate over his controversial theories. Entitled *The Social Contract,* it presents society as a group of unequal beings organized to meet common needs. In the evolutionist's view, the just society is one whose members are protected by sufficient order; at the same time, sufficient disorder provides every individual with full opportunity to develop his genetic endowment, whatever it may be. The social contract is this balance of order and disorder. Ardrey delves

into such subjects as hubris, urban life, the generation gap, population control and violence—as evidenced in animals and man. In all of these areas, the triad of man's innate needs—identity, stimulation and security, in that order—plays a critical role.

Having established a new life and a new reputation after years on the Hollywood treadmill the rumpled, chain-smoking 62-year-old author of the revolutionary evolutionary trilogy has paused between projects to visit old friends, relax and contemplate his work of the past decade-and-a-half. "You know, to the Brentwood set—the swimming pool set—I'm the boy who made good," he observes. "I got out. And although it was rough at first, you get into something like this and it's so bloody fascinating that you toss the rest of your career back in your mind."

The list of movie scripts Ardrey penned will warm a true film buff's heart: *A Lady Takes a Chance, The Green Years, The Three Musketeers, The Secret Garden* and *Khartoum,* among others. Recently, an advertisement appeared in a London newspaper reading, "Gene Kelly in *The Three Musketeers,* by Robert Ardrey. With Lana Turner and June Allyson."

"For the old Hollywood pecking order, that isn't bad at all," the writer notes, beaming.

His South African wife is an artist

Ardrey, who somewhat resembles a cross between veteran actor Jack Gilford and a weary version of Humphrey Bogart, lives in Rome with his wife, a former South African actress named Berdine Grunewald, now an artist. Rome puts him midway between the British Museum in London and the African continent. Would he return to the United States? "I'd have to have an awfully good reason. When you get right down to it, though, I'm not an expatriate. I have a great attachment to the United States.

"On the other hand," he adds quickly, "it would not be easy to return to most American situations—and I've lived for lengthy times in Chicago, New York and Los Angeles. I find life in Rome is far more agreeable and productive. It is a very energetic city, and no ivory tower. Of course, perhaps the very fact that I don't speak Italian and refuse to learn to say anything but the most rudimentary phrases helps defer my boredom with Rome. I don't have to listen to all the verbiage that I must in the United States, where I understand the language."

How does Ardrey describe himself? "That's a question that's been bugging me for the last few years. The trouble is, if you say you're an ethologist, you're putting yourself in competition with Konrad Lorenz and Desmond Morris [author of *The Naked Ape*]. Not for a moment can I suggest that a professional

Robert Ardrey, who readily admits he likes to talk, is photographed during an interview with Mr. Bandler on his new book, *The Social Contract.*

anthropologist—which I am not—should accept me on a professional level. So lately I've been calling myself an evolutionist. My devotion is to the use of the theory of evolution to explain facets of human behavior which I regard as otherwise inexplicable. There is no science called evolution; that's why I invented the term evolutionist. It's a synthesis of various sciences into what is much more a social philosophy than a science in itself."

A native of Chicago, Ardrey received his entire education there, from elementary school through the University of Chicago. As a youngster, he attended Sunday school at the local Presbyterian church. In *African Genesis,* he recalls how the adults held prayer meetings upstairs on Wednesday nights while the children met in the basement for reports and horseplay. The sessions always ended with a short prayer, a shorter benediction, the dousing of the lights and then a massive free-for-all. Ardrey believes that this

experience prepared him for African anthropology.

"North of the equator the contemporary revolution has resembled the polite prayer meetings in the church upstairs," he explains. "It has been discreet, impersonal, colorless, courteous in its differences, seemly in its modesty. But below the equator it has been led by wild men all as vital as leopards, as durable as elephants and as unpredictable as Kenya earth movements. Below the equator the contemporary revolution has been unseemly, indiscreet, a scientific basement shenanigan where a onetime Chicagoan could feel entirely at ease."

Ardrey's college years as a humanities major contained a smattering of anthropology. But a more immediate benefit was reaped from the first creative writing class at Chicago taught by Thornton Wilder.

In a gentle breeze of immodesty Ardrey recalled admission to this special class: "Everyone at Chicago was breaking every other arm to get in. The group was limited to 15. Anyway, I was included; I was sort of the star of the class."

Why? "Because I wrote so well. Simple question, simple answer."

The Thornton Wilder approach to writing, Ardrey remembers, was "highly disciplined." His method of teaching was "simply to read aloud to us everything that was written, good or bad. He taught style through humiliation. You know, you went through bloody hell but really learned something."

Wilder guided his young protégé in playwriting attempts during the 1930s. He was "mad" for Ardrey's second play, *Star Spangled,* which was to become the first to be produced. "It was a bad play, basically," Ardrey recalls, "but it was so full of characterization that it was obvious to many people that I was a playwright." A fellow dramatist, Sidney Howard, obtained a Guggenheim fellowship for the budding writer; ironically, Ardrey was writing the screenplay of Howard's great drama, *"They Knew What They Wanted,"* when the playwright died.

Other plays followed during the 1940s and the early 1950s, along with several novels and a number of screenplays; also four years' service in the Office of War Information during World War II.

His trip to Africa in 1955—first of seven or eight he has made—was prompted by an intuition that the Dark Continent was about to explode. Bored with show business and formerly too poor to travel extensively to Africa and Asia, he was filled with a sense of adventure as he decided to go. In those days, Africa wasn't in the headlines and little warranted a gathering of reporters. Ardrey met with Max Ascoli of *The Reporter,* who said he'd buy anything he wrote. In time, Ascoli was to wind up with some of the first of Ardrey's accounts of the earliest predator, *Australopithecus.*

Now that Ardrey is so deeply committed to behaviorism and evolution, no new play is envisioned. His last was *Shade of Heroes,* a 1961 drama about the Hungarian Revolution that enjoyed a brief run in New York. "My work has the best part of my brain," he explains. "The only way to write a play is if you wake up one morning and my God! There it is! If I got up with a great idea, I'd write a play. But it's not likely to happen at present."

Ardrey's artist wife, Berdine, illustrates his books with her pencil sketches. She was formerly an actress in South Africa. These playful Ceylonese langurs and the vultures opposite come from *The Social Contract.*

Ardrey is a blunt, affable and generally patient man. Pointed questioning fails to faze him. "I am almost unoffendable," he asserts. He tends towards loquacity and freely admits it. But he also can be pithy: "The best thing about definitions, like hundred-dollar bills, is to have plenty of them." And he can laugh at himself: "I lose my reputation as regularly as oak trees lose their leaves."

Indeed, Ardrey views each of his works (his favorite always is the most recent) as potentially imperfect; most admirably, he corrects past errors in subsequent volumes. "That's part of the idea. I find readers are pleased by it, because they're not used to it. One of the great advantages of being an amateur is that a professional must consider things that'll have to be true for the rest of his life. I don't. No temple psychology for me," he declares, using one of his favorite phrases to describe the scientific community's general belief in its members' infallibility, and its reluctance to speak out against fellow scientists. "I can criticize myself," he maintains. "As Lionel Tiger [author of *Men In Groups*] was saying the other day, one of the greatest feelings comes from being able to say 'Well, I goofed that one.' When you're writing a succession of books, you must be as careful as possible to call it the way you see it at the time; but you've got to allow for future discoveries and revisions of estimates."

Vultures gather near a kill, awaiting a chance to scavenge the leavings of the predators.

Baboons "don't have brains"

The central figures in Ardrey's books are lemmings, hippos, baboons, penguins, rhesus monkeys and praying mantises, not to mention langurs, vultures and lions. They are the protagonists in the sprightly, entertaining sketches and anecdotes—or parables—that dot the pages of Ardrey's trilogy. His favorite animal is the elephant "that's what almost any scientist will say"; his least favorite is the hippo. Baboons, he claims, "don't have brains worth brainwashing."

Having based his latest tome on the inequality of male and female, he naturally is quite outspoken on the current feminism, as exemplified by *Homo sapiens* and other animals. "You look at elephants or mountain sheep," he says, "and you'll find, gad, what a matriarchy! What is essentially the society is totally run by a hierarchy of females. The bulls go off drinking."

And in man? "Many authors in the women's lib movement do not recognize—or let's say they reject—certain facts that I would regard as facts of life. I don't know what you do about it; I think you just outlast it, that's all."

Ardrey passionately proclaims that the horror of today's society is not that the female has been denied her role, but rather that she has been denied an understanding of the complexity and challenge of her role. "The business of bringing up children is a terribly complicated job—the toughest in the world. You can't put it into a computer because every child is different. A man has got to learn to place the individual in the category that never existed before. It's the most creative role there is in the human society; but we have so denigrated it and so bemused ourselves with the identicality of human beings that naturally the role of the mother becomes, 'Turn it over to someone else.' The future of women is based on an understanding of men. The day we realize that in our guts, women will cease to complain that they are regarded as less acceptable in certain jobs."

Another innate tendency of man is toward self-fulfillment, as manifested by aggressiveness, "the implacable force which commands the normal human child to abandon its mother's protective shadow and to join the human adventure." In other forms, there is violence and there is war—a kind of organized violence. "Nobody got anywhere who wasn't aggressive," Ardrey asserts. "It is simply the pursuit of one's interests; so many scientists use the word loosely and virtually interchangeably with violence." And Ardrey himself? "I am so aggressive that I have no need for violence in my life."

Society will be the ultimate beneficiary, the writer predicts, if mankind treats each baby—from the day of birth—as potentially violent. One must do everything possible to channel this violence, perhaps inhibit it and divert it into aggressive outlets that are

socially and personally constructive—and away from violent outlets that are destructive.

Myriad subjects fade in and out of view in the course of Ardrey's controversial theorizing:

- Urbanization and the American city: "A city is a human affair. What man has built, man can unbuild."
- The U.S. space program: "The idea—even the phrase—conquest of space, when we were merely exploring the smallest bit of it, was hubris in itself."
- The environment: "One can almost see the orderly disintegration of the environment. There's nothing disorderly; it's perfectly predictable."
- The anti-war demonstrators: "If somebody invaded us tomorrow, we'd discover all the so-called protesters were patriots. There's no patriotism involved on the Vietnam question because there's no territorial challenge. But look at the liberal-minded Britons in the 1930s. They took the Oxford oath that they'd never bear arms and when the first bomb came over, they were all out there."
- Youth: "My sons, Ross (27) and Dan (23) know I'm really with them; I give them hell, but they don't mind; they're sympathetic. I find it valuable that they analyze their contemporaries. Dan told me that never in his life could he have believed that he'd sympathize with the violent solution. Now he can understand it, even though he didn't participate in it. The boys communicate many things to me; we have an almost perfect communications system."

The main contribution Ardrey is making through his work, in his view, is the recognition that to understand a man today, one must understand a fourth dimension—his entire genetic past as far back as one can probe. Gloomy though much of his *Social Contract* may be, as he ponders current problems, its author is not a pessimist. "If you embrace the reality of man, including his past," he says flatly "there is an opportunity for solving today's ills."

The pensive, penetrating evolutionist's work leaves little time for hobbies, what with his constant crawling through African bush or a scientist's laboratory. He has been an on-and-off pianist ever since the days of Chicago jazz. He plays occasionally today, but not if he is in the last two years of writing a book.

Does Robert Ardrey—playwright, screenwriter, musician and evolutionist—identify with a particular animal? "I don't give a damn what your politics are, or what your race is. Everyone, myself included, identifies with the lion. When you go to a game preserve, the first animal you want to see is a lion, and you want to see him kill something. Personally, though, I think he's a damned stupid beast."

Robert Ardrey, at left, walks through a bush campaign during a 1966 visit to Tanzania.

Book reviews

This Little Planet
Edited by Michael Hamilton
(Scribners, $6.95)

The idea that mankind may be doomed to extinction takes time to sink in, but this group of six grim essays argues that we have no more time. *This Little Planet* isn't just another ecology book—it's a careful blend of good scientific and theological thought. It should be read, reread and urged on others.

The authors range from a 79-year-old ecologist to a physicist turned theologian. The material is a frightening array of facts that shows what man has done to his green island in space. If it's short on hope that's because action must replace hopefulness, and now.

For instance, earth required one hundred million years to store up the coal and oil reserves we have depleted in a little more than a century. Per capita, we average using 1,300 gallons of fresh water each day. Desalting the oceans cannot yet fulfill our needs, the book says. Neither can "farming" the seas for food to help prevent the many thousand deaths by starvation that will occur in the time it takes you to read the volume. Says one author, "I do not believe there will be any escape from the agony which awaits us in the immediate future."

Yet for all our woes, we spend $2,000 on war for every $1 spent to fend off the advancing juggernaut of pollution that will soon crush us. Millions of acres of land are eroded past redemption, or lie uselessly under concrete superhighways laid by highway commissioners who ". . . are virtually a law unto themselves, untouchable save when the public is able to reach the ear of a sympathetic governor."

The "greenhouse effect" is mentioned, whereby an excess of carbon dioxide in the atmosphere could change earth temperatures and melt polar ice caps, with worldwide cataclysm the result.

Senator Muskie introduces *This Little Planet* with the words, "Man is out of balance with his environment." Worse than that, say the authors: He is desperately teetering on the brink of extinction —which may be only 30 years away.

Great forests will be a stubble of stumps in three decades. Automobile graveyards sprout like rusty steel gardens —and we, the living, are passing this on to our children. Dare we wonder why they are beginning to curse us for it?

The basic greed of humanity will be its downfall; Man is, in the authors' terms, nature's greatest mistake.

This Little Planet is small in pages, but large in thought. It's not a nice book because the authors feel the time for niceties is long past. Don't run from it. Read it, and know where you stand. Then find out where your elected representatives stand.

—William Childress

The Campaign That Won America:
The Story of Yorktown
Burke Davis
(Dial Press, $8.95)

Banners furled, the troops of Cornwallis file past American and French ranks to lay down their arms. In Lafayette's words, "The play is over."

At Yorktown, Virginia, the final battle for American independence took place in the early autumn of 1781 and claimed only about 800 casualties. Historian Douglas Southall Freeman described the campaign that led up to it as "a textbook model in the relationship of allies and, above all, in concentration." He thought it "strange that these two aspects of the operations of August-October, 1781, have received so little attention."

If one well-planned book can remedy that deficiency, Burke Davis has written it. *The Campaign That Won America* speaks directly to the themes Freeman cited: cooperation between allied commands and the strategic concentration of men and supplies. Such material by itself would make dull reading, but the author

Gen. George Washington firing the first American gun at Yorktown, a situation that may be apocryphal.

deftly weaves the color in with the design.

Take, for example, his treatment of Washington. Years of well-meaning distortions have created a godlike image so indelible that it's almost impossible to visualize the general in a dirty uniform or telling a dirty story. How refreshing that Davis records he was called "Old Hoss," that he would fly into a rage, laugh out loud and jump for joy like a small child.

As for Lafayette, Davis portrays him not as a precocious, blue-blooded freak but as a young enthusiast who, when sapped by a fever, quips: "Perhaps I am dying of old age since two days ago I rang out my twenty-fourth birthday."

Anthony Wayne? Davis recounts how he dealt with five offending soldiers: He had them shot at such close range that their blindfolds caught fire, then he paraded the entire Pennsylvania Line past the gory scene. No wonder they called him "Mad Anthony."

Davis develops his characters as the events that lead to Yorktown unfold. Since he cannot permit any one man to remain on stage for long, he must evoke a presence with concise description and careful selection of anecdotes.

Britain's General Clinton, the French Admiral de Grasse and Washington's Prussian drillmaster, Baron von Steuben, come off well. Rochambeau, the French

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Opera in Italy and Sicilian Archaeology: A tour offering good seats and backstage visits to the opera houses of Italy, and an introduction to the Greek archaeological sites in Sicily. Mrs. Constance Mellen of the Washington Opera Society and Dr. Richard Howland, Smithsonian staff, will conduct—February 1 to 22, 1971.

East African Safari and Indian Ocean Cruise: A five-day visit to the great game preserves of Kenya and Tanzania, followed by a two-week cruise to Aldabra and others of the Seychelles. Dr. George Watson, chairman of the Smithsonian's Department of Vertebrate Zoology will conduct—March 20 to April 15.

Cyprus and Turkey: A tour of archaeological sites in Turkey. The itinerary includes short trips out of Ankara, Alanya and Izmir. Mr. John J. Slocum, on the Museum of History and Technology staff and trustee of the Archaeological Institute of America, will conduct—May 11 to June 1.

Architectural and Historic Tour of Scotland, Wales and Ireland: Visits to private estates in cooperation with the Irish Georgian Society and the Scottish National Trust. Dr. Richard Howland of the Smithsonian will conduct —May 31 to June 22.

Roman Architecture: An inexpensive tour for students, teachers and parents. Visits include Rome, Naples and 10 days in Sicily. Dr. Howland will conduct—July 6 to 30.

South America: A 23-day tour of Colombia, Ecuador, Peru and Brazil, including a short visit to the upper Amazon basin. Tour leaves August 2.

Russia: An unusual tour that includes Samarkand, Kiev, Vladimir and Novgorod, as well as Moscow and Leningrad. Dr. Howland and Professor George Riabov will conduct September 20 to October 12.

commander, and Britain's doughty Lord Cornwallis are seen less clearly, perhaps because they are not as colorful.

This, however, cannot be said of Banastre Tarleton, the young British lion who clawed up the South. One wishes that the author had defined him as fully as he deserved, for "Bloody Ben" was by no means the laughing stock that Davis makes him out to be in one anecdote. It supposedly describes the moments immediately after the surrender.

Tarleton, it seems, was riding a horse that had been stolen. Its owner, brandishing a club, demanded that the colonel dismount, which he promptly did. "Oh! how we did laugh," recalled a bystander, "to think how the mighty man who had caused so much terror and alarm in Virginia had been made to jump off the wrong side of his horse so quickly, with nothing but a sweet gum stick and a chunky little man against him, while he, who was a tall, large likely man had a fine sword by his side."

Judging Tarleton from his record, he may have come close to drawing that sword and starting another war.
—Wayne Barrett

A Krutch Omnibus
Joseph Wood Krutch
(Morrow, $8.50)

Peaceful uses of nuclear energy, voyages through space, a minimal workweek and a dozen other promised wonders do not constitute a "new world." New worlds are created only by great ideas. Thus Christianity contained a great idea and changed the world. The 17th-century idea that science and life are related also renovated the world. But we shall have nothing newer until we conceive how to create conditions suitable to the nature and spirit of 20th-century man.

There in a nutshell paraphrase is the final credo of Joseph Wood Krutch (1893-1970), a social and literary critic who was not only a thinker, but a rethinker. One value in this book of his works is that he himself made the selections, gave it to us by subject matter rather than chronology and wrote connective passages which link and compare his beliefs in youth, maturity and old age. Those of us long enough in the tooth to have followed Krutch's career need no reminder of how lucidly he thought and how profoundly he wrote. To those who are younger, suffice it to say Krutch packs a wallop of wisdom.

Let me finish what I started in the beginning paragraph, for that relates to the opening section of the book which is titled The Modern Temper. Krutch notes that he began life in the golden era of utter certitude, enjoyed youth in that age of confidence before World War I, and lived his writing life in the seemingly endless and intensifying Age of Anxiety. Both World Wars ended in delusion, and by the time Krutch was saying farewell to the 1960s, he had seen with the rest of us that our proud advances in medicine, agronomy, technology and affluence had brought, not chiefly blessings, but overpopulation and planet-wide pollution.

This man's life, then, is symbolic of all life, both of individuals and nations. He reminds us of Freud's theory that the happiest time of human existence is in the womb, later in the cradle which is made to resemble the womb, and that delusion sets in when the person is old enough to behold how little the myths he has learned in childhood resemble realism. It simply is not true, as the child is given to believe, that ". . . The moral order is simple and clear, that virtue triumphs, and that the world is . . . arranged according to a pattern which would seem reasonable and satisfactory to human sensibilities."

Krutch takes several thousand words to convey that which I must condense: Where faith is nonexistent, we must fake or invent it, for surely we cannot live without it. To say that standards, ethics and morals are only mores is shallow thinking. We may in Rome do as the Romans do, for that is courteous, but when in Nazi Germany we do not behave as Nazis, for that is repugnant. Ergo, there are standards of conduct and decency, and we are miserable when we disobey them.

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To say that "You can't change human nature," could mean that man will always be greedy and brutish, but it can also mean that man is brave and noble, that he refuses to be a conformist, or a total materialist, or to have his mind shaped by tyranny. Thus the immutability of human nature, Krutch writes, is ". . . the last best hope for an age which has lost faith in man as, in any sense, the captain of his soul."

Some may find this heavy going, but none who persevere will find it unrewarding. The workings of such an active and informed mind cannot fail to fascinate. Besides, this section ends on page 107, and the remaining three sections have self-describing titles and much graceful prose. The reader who manfully struggles through the perplexities of philosophy at the beginning, will walk into glades of sunshine and shadow when he undertakes the sections called Life, Art and Peace; Miscellaena; and On Some Men and Some Books.

One must pick favorites. There is a tongue-in-cheek familiar essay (1951) which laments that the familiar essay has been driven out of literature by works which editors call the article, the story or just the "piece." Whereas Henry Van Dyke, writes Krutch, would open an essay on fish with the chummy lead, "Many of my best friends are ardent disciples of Isaac Walton," the postwar magazine contributor must open up with statistics, polemics or an anecdote. In another selection (1963), Krutch recalls that H. L. Mencken, his late friend and editor, admired the honorable man ("one who keeps his word") but loathed the moral man ("one who insists that he always does 'what is right under the circumstances' "). This take-off gives Krutch a running start to comment on such events as Roosevelt's departure from the gold standard, the Munich sellout of Czechoslovakia, slogans like "don't die for Danzig," and "better Red than dead." All dishonorable, you see, but possibly moral "under the circumstances."

There are sizable chunks from Krutch's biographies of Poe, Richardson, Thoreau et al., which date back to the yesteryears and may seem labored today. But Krutch (1970) puts on a strong finish with some observations based on a trip to Baja California, Mexico, with Charles Lindbergh on behalf of the World Wildlife Fund. Two ideas emerge from these closing passages. One is that when we return to the wilderness, we are communing with the forces which created all, including man and his mind. The other is that Lindbergh's name will be known for his lone Atlantic flight, whereas Krutch feels people will soon forget the astronauts who landed on the moon. Krutch closes on the hope that our heroes will always be men and not computers.

—Holmes Alexander

How a People Die
Alan Fry
(Doubleday, $4.95)

On finishing this novel of protest against the weaknesses of human nature written by a district supervisor of Canada's Department of Indian Affairs, the reviewer was tempted to interfere in the internal machinery of our neighbor to the north.

She was about to suggest to the government in Ottawa that they send a truckload of the best Scotch to the Indian village of Kwatsi in British Columbia, where the action of the book takes place. If the people of that community are disintegrating into winos, and dedicated Indian agents, conscientious Royal Canadian Mounted Police and all branches of a deeply concerned Canadian government cannot make them drink moderately, at least they should not be done in by rotgut whiskey.

Also, a case should go to the heroes—an Indian agent, Arne Saunders, and a Mountie, Corporal Thompson.

These two should have the fixings for a gentlemanly happy hour, after trying so hard to get the Indians busy doing chores and cleaning up their litter.

However, Saunders and Thompson should be assured that if certain lusty white loggers attempt to crash the party, they may be bounced with the strong backing of the Canadian government. It should be made clear that Ottawa is aware that these fellows—the only bad guys in the book—have gone into the homes of willing Indians bearing jugs of cheap wine. Also that they have been leaping in and out of dirty-sheeted beds with the Indian's middle-aged wives and 15-year-old daughters, while the Indian men are happily pickled.

At that point, the reviewer remembered: The book is fiction. And it is the reader who will really need the comfort of the wine as he goes through these pages. For he will be hooked by a gripping story line. The yarn begins with an Indian baby who dies in its dirty crib, while adults lie around in various sodden stages. A reluctant Mountie, long obsessed with saving the Indian from himself, or whatever is bugging him, charges the parents with negligence in the baby's death. He hopes this will teach the Indians a lesson in personal responsibility. From then on, the author lures us with moving prose, interest in the characters, a whole bag of tricks.

The reader also runs into almost all known theories on how to do something about poverty, and about people uprooted and outside the mainstream. The author is so eager to pack them all in that some in the middle are undigested and the book takes on the mood of a report. The principal character, Saunders, obviously seeks a hard-work solution for the Indians of Kwatsi Village. But he doesn't know how to persuade them to get off the bottle and get busy at something, so he loses his cool.

The novel is almost devoid of humor or joy. The reader is limp at the end. The reader is also deprived, perhaps forever, of any amused interest in the *vase-du-nuit* that he might have had. In this Indian village the reality is depressing. No Louis Quatorze or Louis Quinze chamber pots will ever look the same.

—Angele de T. Gingras

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Smithsonian highlights

Museum of History and Technology

"Do It the Hard Way: Rube Goldberg and Modern Times" is a special exhibition of cartoons, writings, sculpture and inventions, including a working picture-snapping machine (see article, SMITHSONIAN, November).

Museum of Natural History

"Indian Images" is a show of historic photographs of North American Indians taken from 1847 to 1928.

"Smithsonian Scientists Study the Moon Rocks" includes photographs of the investigation of the contents of the moon-rock specimens.

National Collection of Fine Arts

"The Watercolors of William Henry Holmes" is an exhibition of 64 delicate, traditional watercolors of Artist Holmes (1864-1933) whose other careers included archaeology, writing and even museum directing.

"A Look at the World: Mid-Century," shows 26 American paintings and small sculptures from the NCFA's collection to give an individualistic view of the 1950s. Artists represented include Wyeth, Hopper, Shahn and Rivers.

"Jasper Cropsey" is the first major show ever held of the work of this 19th-century landscapist in the tradition of the Hudson River School.

National Portrait Gallery

"John Quincy Adams" is a major exhibition of 40 portraits from life, including oils, sculptures, miniatures and daguerreotypes, documenting one of the most varied political careers in American history (SMITHSONIAN, October).

"Along This Way," a teaching exhibition on black-culture exponent James Weldon Johnson (1871-1938), uses portraits, photographs and recordings to tell about the man and his work.

Division of Performing Arts

December 7 and 8: "Electric Stereoptican"—an electronic music concert.

December 12: "Saturday Jazz"—the Freddie Hubbard Octet.

(For further information on time and place of programs call 202-381-5407.)

Traveling Exhibition Service

Some of the more than 70 Smithsonian exhibits that will appear throughout the country during December are:

Charleston, Illinois—"Paintings by Carl-Henning Pedersen" (Eastern Illinois University, opening December 19).
Kutztown, Pennsylvania—"Art Protis" (Kutztown State College, opening December 5).
Philadelphia, Pennsylvania—"British Designer Craftsmen" (Philadelphia Civic Center, opening December 12).
Norwich, Connecticut—"Photography and the City" (Norwich Free Academy, opening December 19).
Riviera Beach, Florida—"Recent British Prints" (Contemporary Art Center of the Palm Beaches, opening December 12).

Smithsonian Museum Shops

"The World Bazaar" is a display of folk art at the Arts and Industries Building museum shop.

"Minerals, Gems and Shells," with a special jewelry exhibit crafted by Fridl Blumenthal, is at Natural History.

"Toys Around the World" is featured at History and Technology.

Arts and Industries Building

In addition to the one-pound piece of Apollo 11 moon rock, an Early Bird Satellite—the operational backup model for the world's first commercial communications satellite—is here, as is Neil Armstrong's space suit lunar visor.

"The Hand of Man on America" is a photographic documentary by David Plowden of the man-created objects that have helped to shape our country.

"Finnish Design" is a collection of nearly 300 objects by Tapio Wirkkala in stainless steel, plastic, glass and silver.

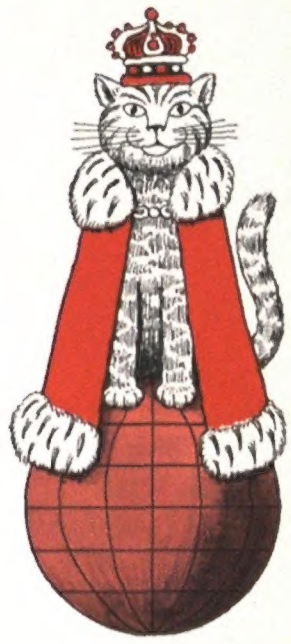
"Space Art," from the collection of the National Air and Space Museum, includes the work of artists such as Robert McCall and Norman Rockwell.

"Genteel Female," lithographs from the Smithsonian's Harry T. Peters "America on Stone" Collection, depicts a romantic view of the 19th-century American woman (see photograph below).

Lithography show includes this young woman in a bloomer costume.

By Patrick Ryan

'The cat sat on the mat' and that's not all it sits on



Ailurophiles the world over may be comforted in their serfdom to learn that cats are currently in official demand down Bogotá way. The director of Environmental Sanitation in the Colombian Ministry of Health has warned that, "indiscriminate use of insecticides and fumigation chemicals in recent years has exterminated the cat population in many regions without halting the vast explosion in the numbers of rodents." Reacting positively to this Hamelin predicament the government is planning to import large quantities of foreign pussies to hold the vermin line while they study ways of increasing the domestic cat population. Perhaps by feeding aphrodisiacs to the remaining Colombian toms.

Qualms cannot be entirely quelled about the psychological side effects on *Homo sapiens* of overexposure to *Felis catus*. The government should first perhaps consider the efficacy of less dangerous rodenticides such as sodium fluoroacetate, hydrogen cyanide, alpha-chloralose or Warfarin. On any Warfarin-resistant super-rats, they might try the latest experimental novelty, 5-p-chlorophenyl silatrane. Or even, perhaps scour the woods around Bogotá for any *mestizo* Emersonian who may be holed up and waiting for the world to beat a path to his better trap.

For millennia too many the cat has come to lord it over the human race. The rot initially set in when the ancient Egyptians started worshiping their cat-headed goddess, Bast, and going to the abject length of shaving off their eyebrows as a sign of mourning when the household mouser purred his last. In Rome, Tiberius Gracchus further inflated the feline ego when he erected a statue of the suave quadruped at the feet of the goddess of liberty. Medieval Christians showed fear of black cats, regarding them as witches' familiars. Even so vocally independent a chap as Doctor Johnson was conned by his cat, Hodge, into spending his hard-earned dictionary royalties to feed the sybaritic beast on oysters. And Florence Nightingale gave her many pet felines further ideas well above their natural stations by naming them after famous contemporaries such as Bismarck. Herself with lamp summoning them in for dinner must have sounded like roll call at some all-time Congress of Europe.

The first words children of yesteryear learned to read were, "The cat sat on the mat," which implanted in the infant mind the truth that no matter who else may have to sit butt-frozen on bare boards, the cat must ever be comfortable about the posterior. It does nothing for a plain man's sense of significance to learn proverbially that a cat has eight more lives than he has and may, if he condescends, look at a king.

The Chinese used to claim that they could tell the time by looking into a cat's eyes. But the only emotion, other than contempt, you'll ever catch in the basilisk orbs of a modern feline is the cold calculation about how much it could eat of you, if you suddenly dropped down dead. Humans, to cats, are but bringers of food, strokers of fur, and blood-heated platforms for sitting on. Cats see men clearly. "Buster," their slit eyes command, "drop that master-of-my-fate veneer, we can see straight through to the quivering punk inside." Cats grin, not because they come from Cheshire, but because they find humans comical.

Willful overexposure of the freedom-loving Colombian people to a surfeit of supercilious cats can only be gravely dangerous for their national morale. It could well lead to a congenitally diffident population living out life with their ponchos pulled over their heads. Better to forget the felines and import packs of terriers that cat lovers deride as fit only for insecure souls whose egos need the bolstering of a dog that thinks you're wonderful. But was there ever a time when the human race more needed all the ego-bolstering it can get?

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